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VOLUME XXIII

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VOL. XXIII, PP. VII-XI JANUARY 28, 1911

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

PROCEEDINGS.

The Society meets in the Assembly Hall of the Cosmos Club on alternate Saturdays at 8 P. M.* Brief notices of the meetings and abstracts of papers presented are published in *Science*.

January 8, 1910—464th Meeting.

President T. S. Palmer in the chair and 55 persons present.

Vernon Bailey exhibited the skull and beak of the *Anhinga*.

The following communications were presented:

The muskrat industry in Maryland: D. E. Lantz.

From Nairobi to Washington with a collection of living animals: A. B. Baker.

The present status of the chestnut tree disease in the United States: Haven Metcalf.

January 22, 1910—465th Meeting.

President Palmer in the chair and 98 persons present.

The following communication was presented:

Fluctuations of animal population in the Northwest: Ernest T. Seton.

The discussion was by T. S. Palmer, Barton W. Evermann, Vernon Bailey, A. D. Hopkins, and others, and was closed by Mr. Seton.

February 12, 1910—466th Meeting.

Vice-President E. W. Nelson in the chair and 72 persons present.

* Meetings for the early part of the year were held in the West Hall of George Washington University.

Barton W. Evermann announced the arrival at the Bureau of Fisheries of two young fur seals, the first of these animals to be successfully fed in captivity.

The following communications were presented:

Alaskan and other far-northern mosquitoes: L. O. Howard.

A collecting trip to Alaska: A. S. Hitchcock.

March 5, 1910—467th Meeting.

The president in the chair and 25 persons present.

General Wilcox reported the taking of a skunk at Woodley Park.

The following communications were presented:

Remarks on a restoration of *Basilosaurus cetoides:* J. W. Gidley.

The stridulations of some "katydids": H. A. Allard.

Japanese goldfish: Hugh M. Smith.

March 19, 1910—468th Meeting.

The president in the chair and 51 persons present.

W. J. Spillman exhibited hoofs and foot-bones of the mule-footed hog.

H. W. Clark reported that he had observed a humming bird and other birds feeding on sap that was oozing from a wounded red-oak.

The following communications were presented:

The birds of Midway Island: Paul Bartsch.

International fisheries regulations: Barton W. Evermann.

April 2, 1910—469th Meeting.

The president in the chair and 36 persons present.

C. D. Marsh reported the receipt of interesting copepods from northern Lake Michigan, through V. L. Shelford of Chicago University.

T. S. Palmer reported plans of Professor Watson to continue his observations on the homing instinct of birds.

The following communication was presented:

A hasty visit to some foreign zoological gardens: A. B. Baker.

April 16, 1910—470th Meeting.

Dr. L. O. Howard in the chair and 37 persons present.

Dr. C. L. Ludlow reported the purchase of ripe strawberries with all the petals still attached.

H. W. Clark reported observations on the three types of flowers and fruit of the hog peanut.

The following communication was presented:

The mosquito campaign in New Jersey: Prof. John B. Smith.

The paper was discussed by L. O. Howard, Barton W. Evermann, C. D. Ludlow, and Frederick Knab.

April 30, 1910—471st Meeting.

The president in the chair and 27 persons present.

Barton W. Evermann reported changes in management of the Fur Seal Islands.

T. S. Palmer described the Glacier National Park about to be established in northern Montana.

He also called attention to the field trips of the Audubon Society on Saturdays during spring bird migration.

The following communications were presented:

Two aspects of the species question: Edward L. Greene.

On the occurrence and habits of waterfowl in the southeastern United States: W. L. McAtee.

October 15, 1910—472d Meeting.

Vice-President Nelson in the chair and 33 persons present.

Vernon Bailey reported large numbers of very tame quails within the city of Washington.

The following communication was presented:

Work of the Committee on Nomenclature at the Graz Zoological Congress: Ch. Wardell Stiles.*

Discussed by L. O. Howard, Marcus W. Lyon, Theodore Gill, E. W. Nelson, and Dr. Stiles.

October 29, 1910—473d Meeting.

President Palmer in the chair and 56 persons present.

Vernon Bailey exhibited specimens of the feet of sharp tailed and pinnated grouse.

* Published in *Science*.

The following communications were presented:

Some foreign entomologists and their work: L. O. Howard.

Periodic movements of birds in relation to the weather: W. W. Cooke.

November 12, 1910—474th Meeting.

The president in the chair and 38 persons present.

Barton W. Evermann reported the arrival at Seattle of a shipment of ten young fur seals intended for the National Zoological Park and other places of exhibit.

The following communications were presented:

A new jaguar record for Texas: Vernon Bailey.

Forage plant investigations in Mexico: A. S. Hitchcock.

Pear thrips investigations in California: A. L. Quaintance.

November 26, 1910—475th Meeting.

The president in the chair and 145 persons present.

O. P. Hay exhibited the remnant of the upper portion of a mammoth's tusk, found in Alaska.

The following communication was presented:

Flashlight photographs of wild mammals: Hon. George Shiras 3d.

December 10, 1910—476th Meeting

THIRTY-FIRST ANNUAL MEETING.

President Palmer in the chair and 31 persons present.

The reports of the recording secretary and treasurer were read and accepted.

The following officers were elected for the year 1911:

President: David White.

Vice-Presidents: W. P. Hay, E. W. Nelson, J. N. Rose, and E. L. Greene.

Recording Secretary: D. E. Lantz.

Corresponding Secretary: N. Hollister.

Treasurer: J. W. Gidley.

Members of the Council: A. D. Hopkins, A. K. Fisher, Vernon Bailey, A. B. Baker, Paul Bartsch.

President David White was elected vice-president to represent the Biological Society in the Washington Academy of Science.

The following chairmen of committees were appointed by the chair:*

On Publications: W. P. Hay.

On Communications: Vernon Bailey.

* Additional members of these committees were appointed at the next meeting as follows: Publications, N. Hollister and J. W. Gidley; Communications, Paul Bartsch and Albert Mann.

VOL. XXIII, PP. 1-2 FEBRUARY 2, 1910

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

DESCRIPTIONS OF TWO NEW MUSKRATS.

BY N. HOLLISTER.

A systematic study of the muskrats discloses two unnamed subspecies, preliminary descriptions of which are herewith presented. Both new forms are based upon specimens in the collection of the United States Biological Survey.

Fiber zibethicus mergens subsp. nov.

Type from Fallon, Nevada. No. 156,880 U. S. National Museum, Biological Survey Collection. ♀ adult, skin and skull. April 3, 1908. Collected by S. E. Piper.

General characters.—Differs from *F. z. osoyoosensis* in its much paler color and distinct dorsal stripe, and from *F. z. pallidus* in its large size and darker colors.

Color.—Fresh pelage: Above grayish brown; head and dorsal area blackish; cheeks, shoulders, and sides rusty; underparts creamy white with central area pale cinnamon or russet; usual spot on chin blackish brown. Fall specimens before the black hairs have come in are sometimes quite rusty above. Worn or washed out pelage: Above uniform pale yellowish brown; sides and underparts with little rusty.

Cranial characters.—Skull smaller than that of *osoyoosensis*, with shorter rostrum, more broadly spreading zygomata, and heavier jugal; much larger than that of *pallidus*.

Measurements of type.—Total length, 540; tail vertebrae, 240; hind foot, 76. Skull: Basal length, 61.6; zygomatic breadth, 40; palatal length, 39.3; length of nasals, 21; breadth of nasals, 9.8; alveolar length of upper molar series, 15.5.

Remarks.—*Fiber z. mergens* is a pale form of the *osoyoosensis* type, occupying the northern part of the Great Basin. There is no evidence of direct intergradation with the very different *pallidus* on the south.

Fiber zibethicus zalophus subsp. nov.

Type from Becharof Lake, Alaska. No. 131,488 U. S. National Museum, Biological Survey Collection. Skin and skull. October, 1903. Collected by A. G. Maddren.

General characters.—Tail short; hind foot small; skull with zygomata not broadly spreading anteriorly; molars small.

Color.—Fresh pelage: General tone of upperparts bistre, darkest on back and hips, with little or no rusty coloring; sides like back, but with a slight russet tinge; brown spot on chin reduced to a mere streak. Underparts creamy white with a cinnamon wash, varying in its intensity, and shading to white on throat and hind legs; lips whitish. Worn or washed out pelage: Upperparts russet to cinnamon, varying greatly in the specimens at hand, but usually showing much more red than in fresh coat, or in any pelage of *F. z. spatulatus*.

Cranial characters.—Skull with zygomata not broadly spreading anteriorly as in *spatulatus;* rostrum and nasals longer; parietals very small, squamosal covering most of area of braincase, even in young animals; interorbital ridge extreme in development into a blade-like crest; teeth small.

Measurements.—The series from the type locality was received without flesh measurements. The length of hind foot of the type, taken from the dry specimen, is 66. Four adults from Lake Clark and Cook Inlet, Alaska, measured in the flesh, average: Total length, 533; tail vertebrae, 228; hind foot, 69.7. Skull of type: Basal length, 60; zygomatic breadth, 38.3; palatal length, 38.3; length of nasals, 20.9; breadth of nasals, 9.2; alveolar length of upper molar series, 14.4.

Remarks.—*Fiber z. zalophus* is a well marked form easily separated from *spatulatus* by a number of constant characters. It ranges from the Alaska Peninsula to the Cook Inlet region.

Vol. XXIII, pp. 3-6 March 23, 1910

PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON

FURTHER NOTES ON FISHES FROM THE CANAL ZONE.*

BY BARTON WARREN EVERMANN AND
EDMUND LEE GOLDSBOROUGH.

In these Proceedings for June 25, 1909 (Vol. XXII, pp. 95–104), the present writers reported on a small collection of fishes obtained in the Canal Zone by Mr. August Busck of the U. S. National Museum and Mr. Allan H. Jennings, of the Sanitary Inspection Service, Canal Zone. In that paper were recorded 19 species, one of which (*Cheirodon gorgonæ*) was described as new.

Since the publication of that report we have received from Mr. Jennings another small, but interesting, collection embracing 133 specimens representing 14 species, which are here recorded. In this connection we wish to express our appreciation of the interest which Mr. Jennings has taken in collecting the fishes of the Canal Zone. He is especially interested in the food of the freshwater fishes and its relation to the mosquito problem. Much that we now know regarding the fishes of the Canal Zone and their food, we owe to him.

Family SILURIDÆ.
THE CATFISHES.

Pimelodus chagresi Steindachner.

One specimen 5 inches long. No definite locality given.

Family CHARACINIDÆ.
THE CHARACINS.

Piabucina panamensis Gill.

One specimen $2\frac{1}{4}$ inches long from a sluggish stream emptying into a dammed-up lake at Gatun, August 15. Dorsal 10; anal 10; scales 26.

* Published by permission of Hon. Geo. M. Bowers, Commissioner of Fish and Fisheries.

Mr. Jennings says this species grows to a length of at least 8 inches, and he did not observe it at any other point.

Brycon striatulus (Kner).

Six specimens 3 to $3\frac{1}{4}$ inches.

Astyanax fischeri Steindachner.

One specimen 3 inches long from Comacho River below reservoir dam at Empire, June 18.

Astyanax æneus (Günther).

Two specimens $2\frac{3}{4}$ and $2\frac{7}{8}$ inches long from Comacho River below reservoir dam at Empire, June 18; twelve specimens $\frac{7}{8}$ to $2\frac{3}{4}$ inches long, no definite locality; one $1\frac{1}{8}$ inches long from Tabernilla, taken in January; and two, $1\frac{1}{4}$ and $1\frac{1}{2}$ inches long, from a sluggish stream emptying into a dammed-up lake at Gatun, August 15. The specimen from Tabernilla was kept by Mr. Jennings in an aquarium for more than 3 months. It ate 33 mosquito larvæ in one day and 20 the next.

Astyanax mexicanus (Filippi).

Five specimens $1\frac{7}{8}$ to $2\frac{1}{2}$ inches long; no definite data given. These have the dorsal uniformly with 9 rays; anal 13 or 14, + 2 or 3 short simple rays; scales 33 to 35; teeth in maxillary in 2 rows, 2 teeth in outer and 4 in inner row; outside of this outer maxillary row is a single irregular row of teeth in the premaxillary. These specimens agree well with typical *mexicanus*, except in the number of anal rays; *mexicanus* is said to have from 17 to 24 branched rays; none of ours has more than 14.

Roeboides guatemalensis (Günther).

Six specimens $2\frac{3}{4}$ to $3\frac{5}{8}$ inches long; no definite locality given. Dorsal 10; anal 46 to 50; gillrakers 6 + 10; scales 78-85.

FAMILY POECILIIDÆ.

THE KILLIFISHES.

Rivulus isthmensis Garman.

One specimen 1 inch long from a swampy, freshwater pond by side of railroad at Gatun, July 15. Lives on bottom.

Gambusia nicaraguensis Günther.

Six specimens 1 to $1\frac{7}{16}$ inches long from Cristobal, August 4. Mr. Jennings says these have a spot on side near vent. This spot is now evident in but two of the specimens. It is dusky brown and covers 3 or 4 scales just above vent, it not being on the scale immediately over vent. Three specimens $\frac{3}{4}$ to $1\frac{3}{16}$ inches long from Folks River Swamp at Cristobal, July 8, and four $1\frac{1}{8}$ to $1\frac{3}{8}$ inches long from same place, August 4.

Gambusia episcopi Steindachner.

Fourteen specimens 1 to $1\frac{1}{2}$ inches long; no definite locality given. These all show distinctly the black spot at base of anal which seems to be characteristic of this species. One specimen $1\frac{1}{8}$ inches long from swampy

freshwater pond at side of railroad at Gatun, July 15. Nine female specimens $1\frac{1}{2}$ to $2\frac{1}{8}$ inches long and one male $1\frac{1}{8}$ inches long from reservoir at New Porto Bello, February 10, 1909. Mr. Jennings says this is the most abundant and characteristic species, but not very efficient larvæ destroyers. It appears to be chiefly a bottom feeder.

Pœcilia sphenops Cuvier and Valenciennes.

Eighteen specimens $1\frac{1}{8}$ to 2 inches long from Folks River Swamp, Cristobal, August 4. These show the many variations of this species indicated by Regan in Biologia Centrali Americana. One specimen $1\frac{1}{2}$ inches long from reservoir at New Porto Bello, February 10, 1909. Dorsal 9; anal ii, 8; scales 26. Teeth conical or pointed, some of them slightly truncate, and one or two tricuspid. One female specimen $2\frac{3}{4}$ inches long from Ancon. This fish was kept in a tank for 3 months and preserved June 18. Six females and one male, $\frac{3}{4}$ to $1\frac{3}{4}$ inches long; no definite locality given. These each show a distinct black spot at anterior base of dorsal fin, covering 3 or 4 rays. The modified anal fin is evident in all, even in the very small one. In the largest example the anal is entirely in advance of dorsal fin and in the others it is variously so, its origin grading back to directly under origin of dorsal. The origin of the dorsal is uniformly equally distant from tip of snout and middle of caudal fin. Seven specimens $\frac{3}{4}$ to $1\frac{5}{16}$ inches long from Gatun, August 15. These all show 7 or 8 distinct vertical bars on body and 5 of the smaller ones show the black spot at anterior base of dorsal.

FAMILY MUGILIDÆ.

THE MULLETS.

Agonostomus monticola (Bancroft).

One specimen 3 inches long; no definite locality given. Four specimens each about $2\frac{1}{4}$ inches long from stream below reservoir at foot of dam at New Porto Bello, February 10, 1909. Mr. Jennings says these are found in swift water only and will not live in ordinary confinement. Habits as to larvæ not observed.

FAMILY CICHLIDÆ.

THE CICHLIDS.

Acara cœruleopunctata Kner and Steindachner.

One specimen 2 inches long from Gatun, August 15. Mr. Jennings says this fish came from a sluggish stream emptying into a dammed-up lake at Gatun, and that the species is apparently widely distributed in the Chagres River and tributaries, of which this stream is one.

Geophagus crassilabris Steindachner.

Five specimens $2\frac{5}{8}$ to $3\frac{7}{8}$ inches long from Canal Zone. Dorsal XVI, 10; anal III, 7; scales 30.

Neetroplus nematopus Günther.

Two specimens $2\frac{1}{2}$ and $3\frac{3}{8}$ inches long. These specimens are very badly preserved, the scales being rubbed off of the anterior part of the

smaller one and over much of anterior lower part of the larger example. The smaller one has dorsal XVI, 8; and VI, 7; the larger one has dorsal XVII, 10; anal VI, 7; scales 30. Each shows a white bar at base of caudal rays, none of it on scales, black posterior to this bar; body of fish uniform dark brown.

FAMILY GOBIIDÆ.
THE GOBIES.

Eleotris pisonis Gmelin.

One specimen $1\frac{3}{4}$ inches long from Beach Island Swamp, Cristobal, August 18. This is brackish water. The feeding habits of the fish were not observed.

Dormitator maculatus (Bloch).

Four specimens $1\frac{1}{2}$ to $3\frac{3}{4}$ inches long from Folk River Swamp. Nine specimens $2\frac{3}{8}$ to $3\frac{3}{8}$ inches long from Ancon. One specimen $2\frac{5}{8}$ inches long from Ancon was kept in a tank 3 months and preserved June 18. Eleven specimens $1\frac{1}{2}$ to 2 inches long from New Porto Bello, February 10, from stream entering reservoir from south. Mr. Jennings says: "Very shy, inhabit bottom, hiding under stones, etc. Habits as to larvæ and adaptability to confinement not observed." One specimen 1 inch long from running ditch of fresh water, with growth of algæ at Cristobal, July 1. Mr. Jennings says its food habits are not known. It remains much at the bottom. Two specimens $\frac{7}{8}$ and 1 inch long from Folks River Swamp, Cristobal, August 4; from mangrove swamp, water brackish, swamp not infrequently overflown, but these fish bore change to fresh water well.

Vol. XXIII, pp. 7-8 March 23, 1910

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

A NEW CRINOID FROM THE SOLOMON ISLANDS.

BY AUSTIN H. CLARK.

The trustees of the Australian Museum at Sydney, New South Wales, through the curator, Mr. Robert Etheridge, Jr., have recently accorded me the privilege of examining their extensive and valuable collections of recent crinoids. The full report upon the material will shortly be published in the "Australian Museum Records" in the form of a monograph upon the crinoid fauna of Australia. It has seemed advisable, however, to present in advance the diagnosis of an interesting new species from the Solomon Islands which was included among the specimens sent to me.

I take this opportunity of thanking the trustees of the Australian Museum and the curator, Mr. Etheridge, for their kindness and generosity in submitting to me for study their very important collections, the examination of which has served to clear up many hitherto obscure points in regard to the interrelationships of the Australian crinoid fauna.

Colobometra diadema sp. nov.

Type locality.—Ugi, Solomon Islands. The type specimen is in the collection of the Australian Museum.

Cirri XI, 33–40, 22 mm. long, in general resembling those of *C. repretum*.

Interambulacral areas of disk completely covered with large plates.

Ten arms about 70 mm. long, more slender than those of *C. repretum*.

Pa absent; P_1 10 mm. long, rigid and spinelike, resembling P_2, with twelve segments, the first two not so long as broad, the third slightly tapering and twice as long as the distal diameter, the following much elongated, nearly or quite four times as long as broad; P_2 to P_5 similar, but 12 mm. long; following pinnules shorter, more slender, and less stiffened; distal pinnules 12 mm. long, very slender, the segments with long spines on their distal edges.

Vol. XXIII, pp. 9-18 March 23, 1910

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

RECORDS OF SOME REPTILES AND BATRACHIANS FROM THE SOUTHEASTERN UNITED STATES.

BY C. S. BRIMLEY.

In the last fifteen years I have purchased a good many reptiles and batrachians from points in the southeastern States, and as they include a number of notable occurrences, it seems to me advisable to publish a list of the species received, with the localities from which they came. All those received from States other than Florida were sent me alive, while from Florida both living and preserved specimens have been received. The localities from which I have received material are as follows:

Mississippi: Bay St. Louis, Hancock County.

Alabama: Greensboro, Hale County.

Georgia: Mimsville, Baker County; Riceboro, Liberty County.

Florida: Green Cove Springs, Clay County; Hastings, St. John County; Orlando, Orange County; Fruitland Park, Lake County; Belleair, Tarpon Springs, St. Petersburg and Fort Meade, Hillsboro County; Miami, Dade County; Key West, Monroe County; Tallahassee, Leon County.

In some cases only a very few specimens were received from a locality, while in other instances they comprised a very respectable proportion of the herpetological fauna of the place. The detailed list follows. I have not deemed it necessary to give comments in every case.

Amblystoma talpoideum.

MOLE SALAMANDER.

Bay St. Louis, Mississippi, over thirty specimens received in the winters of 1897 to 1900; Mimsville, Georgia, 1 received alive February 7, 1903.

Plethodon glutinosus.

VISCID SALAMANDER.

Bay St. Louis, Mississippi, May 24, 1900, 1; Mimsville, Georgia, February 7, 1902, 12; Green Cove Springs, Florida, April, 1898, 1.

Spelerpes guttolineatus.

HOLBROOK'S TRITON.

Bay St. Louis, Mississippi, February 8, 1898, 1.

Desmognathus fusca.

BROWN TRITON.

Bay St. Louis, Mississippi, December, 1897, and March, 1898, 5.

Desmognathus fusca auriculata.

SOUTHERN TRITON.

Hastings, Florida, July, 1898, 3. Probably the Mississippi specimens belong here also.

Diemyctylus viridescens.

AMERICAN NEWT.

Bay St. Louis, Mississippi, December, 1897, February, 1901, 8; Orlando, Florida, July, 1905, 1; Green Cove Springs, Florida, July, 1898, 4.

Amphiuma means.

TWO-TOED DITCH EEL.

Hastings, Florida, numerous small and medium sized specimens and four lots of eggs in 1900 and 1901. The eggs were all taken in July under logs in the partially dry mud of dried up pools. Orlando, October 17, 1904, 2.

Amphiuma tridactyla.

THREE-TOED DITCH EEL.

Greensboro, Alabama, numerous specimens received every spring for the last ten years.

Siren lacertina.

GREAT SIREN.

Hastings, Florida, April, 1901, July, 1902, 2; Orlando, Florida, over a dozen received at various times, mostly small; Green Cove Springs, Florida, May, 1898, 2.

Pseudobranchus striatus.

LITTLE SIREN.

Orlando, Florida, 1, 150 mm. long, received January 27, 1910.

Scaphiopus holbrooki.

SOLITARY SPADEFOOT.

Key West, Florida, 1 young one, April, 1909; Miami, Florida, November, 1900, 1; Orlando, Florida, August, 1902, 1.

Bufo quercicus.

DWARF TOAD.

Received from Hastings, Orlando, Green Cove Springs and St. Petersburg, all in Florida. Evidently common at the first and last two places.

Bufo lentiginosus.

SOUTHERN TOAD.

Bay St. Louis, Mississippi; Mimsville, Georgia; Riceboro, Georgia; Belleair, Florida; Fort Meade, Florida.

Lithodytes ricordii.

RICORD'S LITHODYTES.

Key West, Florida, 1, in April, 1909.

Acris gryllus.

CRICKET FROG.

Bay St. Louis, Mississippi; Green Cove Springs and Fruitland Park, Florida.

Chorophilus ornatus.

ORNATE CHORUS FROG.

Hastings, Florida, June, 1901, 1; Green Cove Springs, Florida, July, 1898, 5.

Chorophilus occidentalis.

SMOOTH CHORUS FROG.

Bay St. Louis, Mississippi, February and April, 1898, 5.

Chorophilus nigritus.

ROUGH CHORUS FROG.

Bay St. Louis, Mississippi, February 10, 1898, 1.

Hyla gratiosa.

GEORGIA TREE FROG.

Bay St. Louis, Mississippi, two received in 1901. Scattering specimens received at various times from Green Cove Springs, Orlando, Belleair, St. Petersburg and Fruitland Park, all in Florida.

Hyla cinerea.

CAROLINA TREE FROG.

Bay St. Louis, Mississippi, abundant. In Florida, specimens from Hastings, Orlando and Fruitland Park.

Hyla (sp.)

Bay St. Louis, Mississippi, in January and February, 1901, several specimens of a tree frog with the sharply defined side line of *cinerea*, but with dark spots on the back like *squirella* were received from this place. My notes state that they were apparently a little stouter than *cinerea* and grayer in color. A single specimen resembling *cinerea*, but lacking the yellow line on the side, also came from here.

Hyla squirella.
SQUIRREL TREE FROG.

Abundant at Bay St. Louis, Mississippi; Orlando, Hastings and Fruitland Park, Florida; specimens also from Green Cove Springs, Belleair and St. Petersburg.

Hyla femoralis.
PINEWOODS TREE FROG.

Specimens from Belleair, Tarpon Springs, Orlando, Green Cove Springs and Fruitland Park, Florida. Apparently less common than *cinerea* and *squirella*.

Hyla versicolor.
COMMON TREE FROG.

Bay St. Louis, Mississippi, 3 specimens.

Engystoma carolinense.
NARROW-MOUTHED TOAD.

Key West, Florida, 3 specimens, April, 1909; Belleair, Florida, 1, July, 1897; Bay St. Louis, Mississippi, 1, February, 1898.

Rana pipiens.
LEOPARD FROG.

Received from Belleair, St. Petersburg and Fruitland Park, Florida; and from Bay St. Louis, Mississippi.

Rana aesopus.
GOPHER FROG.

From Orlando, Fort Meade, Tarpon Springs, Belleair and Green Cove Springs, Florida.

Rana catesbiana.
BULL FROG.

Green Cove Springs, Florida, May, 1898, 1.

Anolis principalis.
GREEN LIZARD.

Bay St. Louis, Mississippi; Fruitland Park, Florida.

Ophisaurus ventralis.
GLASS SNAKE.

Bay St. Louis, Mississippi; Mimsville, Georgia; Orlando, St. Petersburg, Tarpon Springs, and Belleair, Florida.

Liolepisma laterale.
GROUND LIZARD.

Belleair and Orlando, Florida.

Eumeces fasciatus.
BLUE-TAILED LIZARD.

Bay St. Louis, Mississippi; Mimsville, Georgia; Tarpon Springs, Belleair and Orlando, Florida.

Rhineura floridana.
FLORIDA BLINDWORM.

Orlando and Tarpon Springs, Florida. Apparently common at both places.

Farancia abacura.
HORN SNAKE.

Mimsville, Georgia, May 16, 1902, 1; August 10, 1903, 1; Riceboro, Georgia, May 31, 1909, 1 five feet long; also 1 specimen each from Belleair and Orlando, Florida.

Diadophis punctatus.
RING-NECKED SNAKE.

Numerous specimens from Bay St. Louis, Mississippi; 1 from Riceboro, Georgia; and 1 or 2 each from Orlando, Tarpon Springs and Hastings, Florida.

Rhadinæa flavilata.
BROWN-HEADED SNAKE.

Bay St. Louis, Mississippi, abundant. Two specimens from Orlando, Florida.

Heterodon simus.
HOGNOSED SNAKE.

Mimsville, Georgia. Apparently rather common.

Heterodon platyrhinus.
SPREADING ADDER.

Bay St. Louis, Mississippi, 1, March, 1901; Mimsville, Georgia, and Riceboro, Georgia, common, but the black form much commoner than the spotted one at these two places.

Cyclophis aestivus.
SOUTHERN GREEN SNAKE.

Bay St. Louis, Mississippi; Mimsville, Georgia; St. Petersburg and Tarpon Springs, Florida.

Bascanion constrictor.
BLACK SNAKE.

Bay St. Louis, Mississippi; Mimsville, Georgia; Riceboro, Georgia.

Bascanion flagellum.
COACHWHIP.

Mimsville and Riceboro, Georgia; and Orlando, Florida.

Coluber obsoletus confinis.
SPOTTED CHICKEN SNAKE.

Only from Mimsville, Georgia, where it does not appear to be common.

Coluber quadrivittatus.
STRIPED CHICKEN SNAKE.

Riceboro, Georgia, common; also 1 each from Orlando and Fort Meade, Florida.

Coluber guttatus.

RAT SNAKE; SPOTTED RACER.

Bay St. Louis, Mississippi, 3; common at both Mimsville and Riceboro, Georgia; occasional specimens from Orlando, Tarpon Springs and Belleair, Florida.

Spilotes corais couperi.

GOPHER SNAKE.

Only from Belleair and Orlando, Florida.

Pityophis melanoleucus.

PINE SNAKE.

Mimsville, Georgia, 2, June 30, 1906; a few specimens from Orlando, Florida.

Ophibolus getulus.

KING SNAKE.

Mimsville and Riceboro, Georgia; Orlando, Florida.

Ophibolus getulus sayi.

WESTERN KING SNAKE.

Bay St. Louis, Mississippi, 3.

Ophibolus coccineus.

RED KING SNAKE.

Bay St. Louis, common; also from Orlando and Tarpon Springs, Florida.

Stilosoma extenuatum.

SHORT-TAILED SNAKE.

Fort Meade, Florida, 1, April 19, 1909; Tarpon Springs, Florida, 1, January, 1897.

Cemophora coccinea.

SCARLET SNAKE.

Bay St. Louis, Mississippi, 2; Mimsville, Georgia, 7; Orlando, Florida, 9; Tarpon Springs, Florida, 1.

Natrix fasciata.

SOUTHERN WATER SNAKE.

Received from Bay St. Louis, Mississippi; Mimsville, Georgia; Riceboro, Georgia; and Orlando, Florida.

Natrix compressicauda.

FLAT-TAILED WATER SNAKE.

From St. Petersburg and Key West, Florida.

Seminatrix pygæa.

BLACK SWAMP SNAKE.

Orlando, Florida, November 23, 1902; Tarpon Springs, Florida, February 15, 1897; Green Cove Springs, Florida, May 16 and June 23, 1898; 6 specimens in all.

Storeria dekayi.

DEKAY'S SNAKE.

Green Cove Springs and Orlando, Florida; Bay St. Louis, Mississippi.

Virginia valeriæ.

VALERIAS SNAKE.

Mimsville, Georgia, April, May, 1903, 5.

Virginia elegans.

ELEGANT SNAKE.

Bay St. Louis, Mississippi, 10 specimens in 1898 and 1899.

Haldea striatula.

BROWN SNAKE.

Bay St. Louis, Mississippi, a dozen specimens 1897 to 1901.

Liodytes alleni.

ALLEN'S SNAKE.

Green Cove Springs and Orlando, Florida.

Eutaenia sirtalis.

GARTER SNAKE.

Mimsville and Riceboro, Georgia; Tarpon Springs, Florida. The form *ordinatus* is quite common at Mimsville, and I have had one also from Riceboro.

Eutaenia sackeni.

FLORIDA RIBBON SNAKE.

Bay St. Louis, Mississippi, 5 specimens. Also from Green Cove Springs, Orlando and Belleair, Florida.

Tantilla coronata.

CROWNED TANTILLA.

Bay St. Louis, Mississippi, common. Also from Tarpon Springs, Florida, 4; and Orlando, Florida, 1.

Elaps fulvius.

CORAL ADDER.

Mimsville, Georgia; Riceboro, Georgia; common at both places. Also from Orlando and Green Cove Springs, Florida.

Ancistrodon piscivorus.

COTTONMOUTH.

Bay St. Louis, Mississippi; Belleair and Orlando, Florida; Mimsville and Riceboro, Georgia.

Ancistrodon contortrix.

COPPERHEAD.

Riceboro, Georgia, common; not received from any other locality.

Sistrurus miliarius.

GROUND RATTLESNAKE.

Bay St. Louis, Mississippi; Mimsville, Georgia; Orlando, Belleair and Green Cove Springs, Florida.

Crotalus adamanteus.

DIAMOND RATTLESNAKE.

Mimsville, Georgia, 1, June 24, 1907; in Florida, from Orlando and Miami.

Testudo polyphemus.

GOPHER TORTOISE.

Mimsville, Georgia; Belleair and Orlando, Florida.

Malaclemmys macrospilota.

FLORIDA DIAMONDBACK.

Belleair and St. Petersburg, Florida; apparently common.

Graptemys pulchra.

BAUR'S TERRAPIN.

Mimsville, Georgia, 1, November 20, 1901.

Deirochelys reticulata.

CHICKEN TERRAPIN.

Mimsville, Georgia, abundant. Also from Green Cove Springs, Hastings, Orlando, St. Petersburg and Belleair, in Florida.

Chrysemys rubriventris.

RED-BELLIED TERRAPIN.

Orlando, Florida, 1, March 13, 1902.

Chrysemys mobiliensis.

MOBILE TERRAPIN.

This is Baur's *mobiliensis*, but I can not distinguish the few Mimsville, Georgia, specimens I have received, from Raleigh, North Carolina, specimens of *C. concinna*.

Chrysemys floridanus.

FLORIDA TERRAPIN.

Mimsville, Georgia, common. Also from Orlando and Belleair, Florida.

Chrysemys scripta.

YELLOW-BELLIED TERRAPIN.

Mimsville, Georgia, abundant; none from Florida. Though there is great variation in this respect, the markings on the plastron are apt to be larger and present on more plates in Georgia specimens than in Raleigh, North Carolina, ones. Although the black spots on the two gular plates are almost always present, yet in two Raleigh specimens I had in 1909 there were no spots on either bridge or plastron, and from

this condition there is every gradation until at last in some Mimsville specimens there are elongate black spots on every plate of the plastron and of the bridge. The upright yellow bar behind the eye is the most positive color mark of this species, but is sometimes very obscure in old specimens.

Chrysemys troosti.

TROOST'S TERRAPIN.

Three specimens from Mimsville, Georgia, received July 1, 1907, 2; June 18, 1909, 1. All the species of *Chrysemys* and *Deirochelys* are commonly known as cooters in Florida and Georgia.

Chelopus guttatus.

SPECKLED TERRAPIN.

Riceboro, Georgia, 1, received May 5, 1902.

Terrapene major.

LARGE BOX TURTLE.

Tallahassee, Florida, 2; Riceboro, Georgia, 1.

Terrapene bauri.

BAUR'S BOX TURTLE.

Bay St. Louis, Mississippi, 1; Mimsville, Georgia, 1; also numerous examples from Florida (Green Cove Springs, Hastings, Orlando, St. Petersburg and Belleair). I think this is identical with *major*, particularly as there is no constancy in the number of claws on the hind feet, they being as often 4–4, as 3–3, and not infrequently 4–3.

Terrapene triunguis.

THREE-CLAWED BOX TURTLE.

Mimsville, Georgia, abundant. Also from Riceboro, Georgia, and Bay St. Louis, Mississippi. Apparently only a subspecies of *carolina*, in which connection it may be stated that at Raleigh, North Carolina, three-clawed examples of *carolina* occasionally occur.

Cinosternum bauri.

BAUR'S MUD TURTLE.

Common in Florida; have received specimens from Green Cove Springs, Hastings, Orlando, St. Petersburg and Fort Meade.

Cinosternum louisianæ.

LOUISIANA MUD TURTLE.

Mimsville, Georgia, 2 specimens. This appears to be a southern form of *C. pennsylvanicum*, possibly on the verge of becoming a species. At Mimsville, *pennsylvanicum* is the common form. At Colmesneil, in eastern Texas, the mud turtles appear to be intermediate, some being nearest *pennsylvanicum* and some nearest *louisianæ*. At Waco, Texas, nearly all are *louisianæ*, while at Austin, Texas, *flavescens* is the common species, with an occasional *louisianæ*.

Cinosternum pennsylvanicum.

COMMON MUD TURTLE.

Mimsville, Georgia; Riceboro, Georgia. Some specimens received from Bay St. Louis, Mississippi, in 1897 and 1900 are also referred here as they were certainly not *louisianæ*, and probably not *steindachneri*.

Cinosternum steindachneri.

STEINDACHNER'S MUD TURTLE.

Hastings, Orlando and St. Petersburg, Florida, common. In the size of the plastron is intermediate between the preceding and the next.

Aromochelys tristycha.

SOUTHERN MUSK TURTLE.

Orlando, Florida, common. Am very doubtful as to this being in any way different from *odoratum*.

Aromochelys carinatus.

KEELED MUSK TURTLE.

Mimsville, Georgia; quite a number received from this locality in 1900 and 1902.

Chelydra serpentina.

SNAPPING TURTLE.

Mimsville, Georgia; a few small specimens.

Thalassochelys caretta.

LOGGERHEAD SEA TURTLE.

Twenty-five newly hatched young received from Belleair, Florida, October, 1897.

Trionyx ferox.

SOUTHERN SOFTSHELL TURTLE.

Mimsville, Georgia; Orlando, Belleair, Green Cove Springs and St. Petersburg, Florida.

Alligator mississippiensis.

ALLIGATOR.

Young specimens received from Riceboro, Georgia; Bay St. Louis, Mississippi; Orlando and Belleair, Florida.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

BRIEF SYNOPSIS OF THE WATERRATS OF EUROPE.

BY GERRIT S. MILLER, JR.

The following brief synopsis of the European members of the genus *Arvicola* is primarily based on studies made in the British Museum during the summer of 1908.

Genus ARVICOLA Lacépède.

Arvicola amphibius (Linnæus).

Size large (head and body about 200 mm., tail about 110 mm., hind foot usually 30 to 34 mm., condylobasal length of fully adult skulls 40 to 44.6 mm.); tail somewhat more than half as long as head and body; color above dark brown, blackening along back, the sides not decidedly yellowish, the cheeks not contrasted with surrounding parts; skull not fossorial in form, the occiput and rostrum tending to be squarely (vertically) truncate, the upper incisors not conspicuously projecting; *nasals at widest region* conspicuously narrower than rostrum; roots of m_1 and m_2 forming evident protuberances on lower surface of mandible in old individuals; habits strictly aquatic, never mole-like. Confined to Great Britain.

Arvicola amphibius amphibius (Linnæus).

1758. [*Mus*] *amphibius* Linnæus, Syst. Nat., I, 10th ed., p. 61 (England: based on the *Mus major aquaticus* of Ray).

Size maximum for the species (hind foot in adults usually 32 to 35 mm.; condylobasal length of skull 42 mm. or more); color moderately dark, the black rarely in excess of brown on upperparts; melanism infrequent. England and southern Scotland.

Arvicola amphibius reta nom. nov.

1832. *Arvicola ater* Macgillivray, Mem. Wernerian Soc. Nat. Hist., VI, p. 429. (Aberdeen, Scotland). Not *Hypudæus terrestris β ater* Billberg, 1827, a synonym of *Arvicola terrestris*.

Size less than in *A. amphibius amphibius* (hind foot usually 30 to 32 mm., condylobasal length of skull usually less than 42 mm.); normal

color darker than in the typical race, the black usually in excess on upperparts; melanism frequent. Central and northern Scotland.

Arvicola sapidus Miller.

Like *Arvicola amphibius* but nasal bones much widened anteriorly, their greatest combined breadth nearly equal to that of rostrum; habits aquatic. Iberian Peninsula and southern France, east nearly to the Italian border; northern limits of range not known.

Arvicola sapidus sapidus Miller.

1908. *Arvicola sapidus* Miller, Ann. and Mag. Nat. Hist., 8th ser., I, p. 195. February, 1908. (Santo Domingo de Silos, Burgos, Spain).

Color not so dark as in *A. amphibius amphibius*, the sides and face a clear yellowish brown without noticeable sprinkling of blackish hairs. Essentially the entire Iberian Peninsula; lowlands of southern France east of the Pyrenees. French specimens not perfectly typical.

Arvicola sapidus tenebricus (Miller).

1908. *Arvicola tenebricus* Miller, Ann. and Mag. Nat. Hist., 8th ser., I, p. 196. February, 1908 (Biarritz, Basses-Pyrénées, France).

Color essentially as in *A. amphibius amphibius*, the sides and face conspicuously sprinkled with blackish hairs. Pyrenees and Atlantic coast of southwestern France, north to the Garonne; northern limits of range not known.

Arvicola terrestris (Linnæus).

1758. [*Mus*] *terrestris* Linnæus, Syst. Nat., I, 10th ed., p. 61 (Upsala, Sweden).

Size less than in *A. amphibius* (head and body about 175 mm., tail about 100 mm., hind foot usually 28 to 31 mm., condylobasal length of adult skulls 36 to 39 mm.); color dark, essentially as in *A. amphibius reta*, but cheeks usually more yellowish than surrounding parts; skull slightly but evidently fossorial in form, the rostrum and occiput tending to be obliquely truncate, the upper incisors projecting noticeably forward; interparietal tending to be subquadrate in outline; teeth rather heavy, but roots of m_1 and m_2 not forming protuberances on lower surface of mandible; habits both aquatic and mole-like. Scandinavian Peninsula, eastward into Russia; limits of range not known.

Arvicola italicus (Savi).

1839. *Arvicola amphibius* var. *italica* Savi, N. Giorn. de' Letterati, XXXVII, No. 102, p. 202 (p. 5 of separate), February, 1839 (Pisa, Italy).

Similar to *Arvicola terrestris*, but teeth not so heavy and color not so dark, the underparts washed with yellowish brown instead of rusty; the cheeks not contrasting noticeably with surrounding parts. Italian Switzerland and northern Italy, south at least to the vicinity of Pisa.

Arvicola illyricus (Barrett-Hamilton).

1899. *Microtus musignani illyricus* Barrett-Hamilton, Ann. and Mag. Nat. Hist., 7th ser., III, p. 225. March, 1899 (Bosnia, no exact locality).

Like *Arvicola italicus* but underparts with a decided whitish wash. Bosnia.

Arvicola musignani de Sélys-Longchamps.

1839. *Arvicola musignani* de Sélys-Longchamps, Revue Zoologique, p. 8, January, 1839. (Rome, Italy).

Size and general characters as in *Arvicola italicus*, but color pale and yellowish, like that of *A. sapidus sapidus*. Central Italy, at present known from the west coast only.

Arvicola scherman (Shaw).

Essentially as in *Arvicola terrestris* but more modified for fossorial life, some of the races having become completely terrestrial; palmar and plantar tubercles reduced, occupying less than half surface of region in which they occur; skull distinctly fossorial in form, the incisors strongly protruding; interparietal tending to be narrow and lignlate in outline. West-central continental Europe from the Pyrenees and Alps to the Baltic; eastern limits of range not known.

Arvicola scherman scherman (Shaw).

1801. *Mus scherman* Shaw, Gen. Zool., II, pt. I, p. 75 (Strassburg, Germany).

Palmar and plantar tubercles relatively smaller than in *Arvicola terrestris*, though not so much reduced as in the strictly terrestrial forms; length of hind foot about 26.5 mm.; condylobasal length of fully adult skulls 35.6 to 36.4 mm.; color of upperparts dark brown usually much clouded with black; tail usually dark brown throughout; habits both aquatic and mole-like. Continental Europe from the Baltic south into Belgium and to southern Germany; limits of range imperfectly known.

Arvicola scherman exitus subsp. nov.

Type, adult female (skin and skull) in British Museum (not registered), St. Gallen, Switzerland, April 28, 1900. E. Zollikofer.

Palmar and plantar tubercles much reduced, occupying distinctly less than half area in which they occur; length of hind foot 22 to 25 mm.; condylobasal length of fully adult skulls 33 to 35 mm.; color of upperparts a light yellowish brown usually without much black clouding; tail buffy throughout or evidently bicolor (never uniformly blackish); audital bullæ not highly inflated, their surface often irregularly flattened; anterior loop of m_1 short and wide; habits strictly terrestrial, mole-like. Alps (not known from the Italian side) at moderate altitudes, and immediately

adjoining lowlands of Switzerland and France; eastward into Tirol; limits of range not known. Measurements of type: head and body, 138; tail, 64; hind foot, 24; ear, 13; skull: condylobasal length, 33.8.

Arvicola scherman monticola (de Sélys-Longchamps).

1838. *Arvicola monticola* de Sélys-Longchamps, Revue Zoologique, p. 249 (Pyrenees).

Like *Arvicola scherman exitus* but audital bullæ usually larger and more evenly inflated, and first lower molar with anterior loop longer and narrower than in the Alpine form; habits strictly terrestrial, mole-like. Pyrenees and their immediate neighborhood (known at present from the French side only); a related and perhaps identical animal occurs in the Puy-de-Dôme region.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

NOTES ON MAMMALS OF THE MIDDLE MISSISSIPPI VALLEY, WITH DESCRIPTION OF A NEW WOODRAT.

BY ARTHUR H. HOWELL.

The field work of the Biological Survey in 1909 included a survey of southeastern Missouri, southern Illinois and Indiana, and parts of Kentucky. This trip, accomplished between April 20 and July 15, resulted in the accumulation of much new information on the distribution of the mammals of the region, and since very little has been published concerning the mammals of any of the States visited, excepting Indiana,* it is considered desirable to place on record the more important results of the season's work.

Missouri was the first State visited, and after a few days spent near St. Louis—at Horseshoe Lake, St. Charles County (April 21, 22)—I proceeded to the interesting "sunken lands" of southeastern Missouri. Collections were made principally on the St. Francis River, west of Senath (April 25–30) and at Kennett (May 1, 2), Portageville (May 3, 4), and Cushion Lake (May 5–7). Short stops at Marble Hill (May 8–10) and at Cape Girardeau (May 11, 12) resulted in determining the upper limits of Lower Austral Zone in the State.

After crossing the Mississippi at Cape Girardeau, investigations were continued in Illinois at the following localities: McClure (May 13), Olive Branch (May 14–21), Cobden and Lick Creek (May 22), Wolf Lake (May 23–25), Riehl Station, near Alton (May 29, 30), Odin (June 4, 5), Olney (June 6–9), Kansas (June 10, 11), St. Francisville (June 12), Shawnee-

*See a valuable contribution by W. L. Hahn, on "The Mammals of Indiana," < 33d Ann. Rep. Dept. Geol. & Nat. Resources of Indiana, 1909, pp. 417–663.

town (June 17, 18), Golconda (June 19–21), and Reevesville (June 22).

In Indiana short stops were made at Cypress, Knox County (June 12), New Harmony (June 13–15), and Mt. Vernon (June 16).

In Kentucky collections were made at the following localities: Rockport (June 23, 24), Hawesville (June 25–28), Mammoth Cave (June 29–July 5), Midway (July 6–11), and Jackson (July 12–14).

The region visited during this trip forms the meeting place for Upper-and-Lower Austral Zones, and an effort was made to determine with some exactness the boundary between them. Lower Austral occupies the "sunken lands" and swampy river bottoms of southeastern Missouri and western Kentucky, extending north in Missouri as far as Whitewater and Cape Girardeau. A line drawn diagonally across the State through Poplar Bluff and Cape Girardeau will mark quite accurately the upper limit of Lower Austral in Missouri. In Illinois this zone covers the whole of the southern portion of the State from East Cape Girardeau to Golconda, with a narrow tongue along the Mississippi as far north as Grand Tower. In Kentucky the eastern limits of Lower Austral were not definitely determined, but it doubtless includes the greater part of the counties bordering the Mississippi River, and extends in a narrow belt along the Ohio as far as Berry Ferry (opposite Golconda, Illinois). All the rest of Kentucky is in Upper Austral Zone, excepting a few isolated mountain summits in the extreme eastern part of the State, where small areas of Transition appear.

Following is a list of the most characteristic Lower Austral species occurring in southern Illinois:

MAMMALS OF LOWER AUSTRAL ZONE.

Peromyscus gossypinus — *Sylvilagus aquaticus*
Oryzomys palustris — *Blarina brevicauda carolinensis*
Nycticeius humeralis.

BIRDS OF LOWER AUSTRAL ZONE.

Catharista urubu — *Helinaia swainsoni*
Antrostomus carolinensis — *Protonotaria citrea*
Peucæa æstivalis bachmani

PLANTS OF LOWER AUSTRAL ZONE.*

Taxodium distichum	*Ulmus alata*
Nyssa aquatica	*Celtis mississippiensis*
Quercus lyrata	*Gleditsia aquatica*
	Arundinaria tecta

LIST OF MAMMALS.

Sciurus niger rufiventer Geoffroy.

FOX SQUIRREL.

Fox squirrels are fairly common locally over the whole of the region traversed.

Records were secured of their occurrence at the following localities:

Missouri: Horseshoe Lake, St. Charles County; Marble Hill; Cushion Lake (4 specimens).
Illinois: Wolf Lake; Olive Branch; Kansas; Golconda.
Indiana: New Harmony (1 specimen).
Kentucky: Hawesville; Mammoth Cave; Midway; Jackson.

Tamias striatus (Linnæus).

CAROLINIAN CHIPMUNK.

Occurs in moderate numbers nearly everywhere excepting in the big swamps.

They were reported to me at the following localities:

Missouri: Marble Hill.
Illinois: Olive Branch; Wolf Lake (1 specimen); Woodlawn; Olney.
Indiana: New Harmony.
Kentucky: Rockport; Mammoth Cave (2 specimens); Midway; Jackson.

Marmota monax (Linnæus).

WOODCHUCK; GROUND HOG.

The woodchuck occurs in the hilly portions of the Mississippi Valley States as far south at least as southern Illinois, southern Missouri, and western Kentucky.

Records were secured of their occurrence in the following localities:

Missouri: Meramec Highlands (15 miles southwest of St. Louis); Marble Hill.
Illinois: Shelbyville (specimen from there seen in a St. Louis taxidermist shop); Riehl Station, near Alton; Woodlawn; Golconda; Olive Branch.
Indiana: New Harmony.
Kentucky: Mammoth Cave (1 specimen); Berry Ferry; Midway; Jackson.

* In this connection, see papers by Robert Ridgway on the native trees of the lower Wabash Valley, in Proc. U. S. N. M., V, pp. 49–88, 1882, and XVII, pp. 409–421, 1894.

Citellus tridecemlineatus (Mitchill).

STRIPED SPERMOPHILE; GROUND SQUIRREL.

This small ground squirrel is a prairie dweller, and is distributed locally over the northern parts of Illinois and Indiana. Hahn records it from various places in northern Indiana as far south as Terre Haute.* Its southern limit in Illinois was found to be close to the town of Kansas, where a small colony was located in a cemetery. Inquiries for the animal at Casey and Greenup, a little farther south, indicated that it does not occur there.

Specimens have been identified in the Biological Survey from the following localities:

Illinois: Hickory, Lake County; Sunbeam, Mercer County; Saxon, Henry County; Kishwaukee; Kansas; Argenta; Warsaw (specimen in U. S. Nat. Mus.).

Peromyscus gossypinus megacephalus (Rhoads).

WESTERN COTTON MOUSE.

This species is common in the swamps of the Lower Austral Zone and is frequently taken, also, in wooded bluffs in the same zone. It ranges north to southern Illinois and southeastern Missouri.

Specimens were collected at the following localities:

Missouri: St. Francis River (west of Senath), 8; Portageville, 1; Cushion Lake, 1.

Illinois: Olive Branch, 2; Wolf Lake, 1; Golconda, 3.

Peromyscus maniculatus bairdi (Hoy & Kennicott).

PRAIRIE WHITE-FOOTED MOUSE.

Although mainly confined to prairie regions, this species has been taken occasionally in bottomland timber. Its range extends south to extreme southern Illinois.

Specimens were taken at the following localities:

Missouri: Horseshoe Lake, St. Charles County, 1.

Illinois: Riehl Station, near Alton, 1; Kansas, 3; Olive Branch, 1; McClure, 1.

Oryzomys palustris (Harlan).

RICE RAT.

This species is found throughout the Austroriparian Fauna and its range extends also well into the Carolinian along streams.

It was taken for the first time in Missouri and Illinois and may be looked for as well in southern Indiana and Ohio.

Specimens were collected at the following localities:

Missouri: Kennett, 2; Portageville, 1; Marble Hill, 1.

Illinois: Olive Branch, 4.

* Thirty-third Ann. Rep. Dept. Geol. of Indiana, pp. 475–478, 1909.

Neotoma pennsylvanica Stone.

ALLEGHENY CAVE RAT.

This species may be found in suitable situations throughout the eastern part of Kentucky at least as far west as Mammoth Cave, and as far north as the Ohio River. It probably occurs, also, in the cliffs on the Indiana side of the river.

At Mammoth Cave they are numerous, both in the main cave and in a small cave known as the White Cave, but I found no signs of their presence about the cliffs and large rocks on the Green River hillside at this place. In the Mammoth Cave they are found as far back as one can penetrate. Two specimens were trapped at a point about 2½ miles from the entrance, and others at the mouth of the cave. The rats enter the cave through the main entrance (which is the only known entrance) and possibly also through small crevices leading down from the cliffs or small caves on the Green River hillside. At various points in the cave their tracks are very abundant in the sand on the floor and there are numerous hard-packed trails running close to the walls and into side crevices. The great number of tracks doubtless gives an exaggerated idea of the abundance of the rats, for since there is nothing except human footsteps to obliterate the tracks, they may remain intact for a long period. Several large piles of rat excrement were noticed, but comparatively little rubbish had been brought in by the animals. Quite a few nut shells (hickory, acorns, and hazel nuts) were seen, but no green vegetation and no piles of sticks.

The guides frequently see the rats while in the cave, and as they are never disturbed they are very gentle and unsuspicious. They occasionally come about the tables in the dining hall in the cave and instances are reported of their having come regularly to be fed by the guides. The former manager of the Mammoth Cave estate once had a cave rat in captivity, and he discovered accidentally that not only could he handle it with impunity, but it actually enjoyed being stroked and seemed to become drowsy under the operation. This rat always chose vegetable food in place of meat when both were offered it.

In the White Cave, which is only about 200 yards long, and near the surface, I found the rats numerous and was able to observe their peculiar mode of living. In this cave they make small nests or "forms" of finely shredded cedar bark, just about the size and shape of a meadow lark's nest, though not arched over at all. These resemble closely the "forms" of the cottontail rabbit. I found five or six of these nests placed on the floor of the cave, close to the wall, and on a narrow ledge of rock near the ceiling. Some of them were occupied by the rats at the time, and several specimens were secured here. The only other material brought into this cave by the rats are small tips of cedar branches; these are strewn quite thickly around their nests and one large rock was completely covered with them. A few old nut shells were found also, but no leaves or branches of any tree but cedar (*Juniperus virginiana*). The cedar may have been brought in to be used as food, but none of it was found in the

stomachs of the rats taken here which have been examined. They were found to be filled with a finely chewed mass of fresh green vegetation, not identifiable, but certainly not cedar. The stomachs of the two individuals taken 2½ miles back in Mammoth Cave contained fragments of apple, leaves, sorghum seeds and onion, a few small beetle larvæ, fly larvæ and bits of beetle.

At Hawesville, Kentucky, I found this species fairly numerous about the wooded cliffs along the river, and here, as at Mammoth Cave, very few sticks had been carried into the crevices, but freshly cut leaves and plants were observed in several places.

In the vicinity of Jackson, Kentucky, these rats are well known to the inhabitants and are apparently common about rocky ledges all through that region. They often come down about farm buildings located near the cliffs and are reported to do some damage in corn cribs. One specimen was trapped along a cliff close to a house at Lost Creek, Breathitt County.

Neotoma floridana illinoensis subsp. nov.

ILLINOIS WOODRAT.

Type from Wolf Lake, Illinois. Adult female, No. 167,752, U. S. National Museum, Biological Survey Collection, January 12, 1910. John Johnson.

General characters.—Similar in color to *N. f. baileyi* but with longer and darker tail; skull nearest to that of *N. f. rubida* but slightly smaller.

Color.—Upperparts mixed buff and black, varying in some specimens to ochraceous buff; fore part of head and face gray; tail distinctly bicolor, blackish above, grayish-white below; feet pure white; underparts grayish-white with a tinge of yellow.

Cranial characters.—Skull slightly smaller than that of *rubida;* zygomata more widely spreading anteriorly, their sides nearly parallel; palate more deeply notched (the interpterygoid fossa less evenly rounded); spheno-palatine vacuities reduced to narrow slits.

From *baileyi* and *attwateri* the present form differs cranially in the same characters that distinguish it from *rubida* and in addition the rostrum and nasals are longer and slenderer.

Measurements.—Average of eight adults from type locality: total length, 430 (390–435); tail vertebrae, 195 (187–205); hind foot, 38 (36–40).

Remarks.—Woodrats of this group have not previously been taken in the Mississippi Valley bottomlands at any point north of Louisiana. It was quite a surprise, therefore, to find the animals in southern Illinois at the upper edge of the Lower Austral Zone. A few old signs and deserted nests of woodrats were found in the heavy timber along the St. Francis River, Missouri, but all efforts to trap specimens proved unsuccessful. The cliffs along the Mississippi River north of Alton, Illinois, and south of St. Louis, Missouri, were explored for signs of these animals, but no indications of their presence were discovered. They were also looked for unsuccessfully in the cliffs at Golconda, Illinois.

The animals are common at Wolf Lake, inhabiting the high rocky bluffs

which border the east side of the lake. They live in crevices and caves into which they carry large quantities of sticks, leaves, and other rubbish. Their habits in this locality are thus like those of *N. pennsylvanica* and unlike those of *rubida* in the Southern States where this species lives in swamps and builds its nests in hollow logs or trees and in the branches of trees some distance from the ground. The swamp conditions were present at this northern station, but the adjacent cliffs evidently proved more attractive to them, as is usually the case with the members of this genus.

Three adults and one young, all in worn pelage, were captured at Wolf Lake May 24, 25, and in January, 1910, eight more adults in full fresh pelage were secured by a local trapper.

Microtus pennsylvanicus (Ord).

EASTERN MEADOW MOUSE.

The common meadow mouse occupies the bluegrass region of Kentucky, but was not found in other sections of the State. It was rather common at Midway, where specimens were taken, and Dr. Mearns has also taken them at Lexington. Their range probably does not extend much farther south or west than this. None were found in southern Illinois or in the Wabash Valley in Indiana. Hahn records the species, however, from Bloomington and Bascom, Indiana.*

Microtus ochrogaster (Wagner).

PRAIRIE MEADOW MOUSE.

This is the common meadow mouse of the upper Mississippi Valley, at least as far south as southern Illinois and Missouri. Unlike the eastern species (*M. pennsylvanicus*) they prefer dry situations, and are frequently found in matted grass along roadsides and in old meadows. They have not as yet been taken in Kentucky, but in a grass field at Mammoth Cave I found a few mouse signs which I believe were made by this species. Hahn records the species from various points across the State of Indiana,† and Langdon speaks of them as common in the vicinity of Cincinnati.‡

Specimens were taken at the following localities:

Missouri: Horseshoe Lake, 6; Marble Hill, 3.

Illinois: Olive Branch, 3; Wolf Lake, 1; McClure, 1; Odin, 2; Olney, 2; Kansas, 2.

Fiber zibethicus (Linnæus).

MUSKRAT.

Muskrats are common on all the streams in the region visited, particularly in the St. Francis River, Missouri, and on Horseshoe Lake (near Olive Branch), Illinois. Many thousands are trapped here every winter, but at the time of my visit (April and May) their numbers had been greatly reduced and they were very shy and difficult to secure. A few breeding

* Mammals of Indiana, 33d Ann. Rep. Dept. Geol. & Nat. Resources of Indiana, pp. 506, 507, 1909.

† Mammals of Indiana, l. c. pp. 509, 510.

‡ Journ. Cincinnati Soc. Nat. Hist., III, p. 307, 1880.

dens built under the roots of large tupelos or cypresses growing in deep water, were examined, but only one young muskrat was caught. During the winter the rats build numerous large houses in the lakes or marshes, but by spring these dens are usually all destroyed or carried away by high water.

Five specimens, taken in Horseshoe Lake, Illinois, in December, agree very closely with September specimens of *zibethicus* from Massachusetts.

Muskrats were reported to occur at the following localities:

Missouri: Horseshoe Lake, St. Charles County; St. Francis River; Cushion Lake; Marble Hill.

Illinois: Olive Branch; Wolf Lake; Woodlawn; Olney; Kansas; Shawneetown.

Kentucky: Midway; Mammoth Cave; Jackson.

Synaptomys gossi Merriam.

GOSS LEMMING MOUSE.

This species, previously known only from Kansas, was found in numbers at Horseshoe Lake, St. Charles County, Missouri, April 21 and 22, and a good series of specimens was secured. A large colony had occupied a low marshy meadow close to the Mississippi River. At the time of my visit the water in the river was very high, and the meadow was overflowed to a depth of 12 to 18 inches. The mice had been driven from their burrows by the high water, and were hiding as well as they could on tussocks and under patches of floating debris. When disturbed they ran rather slowly over the submerged vegetation and swam freely, but were easily overtaken. Many had been killed by dogs or other predatory animals, and I was able to get as many specimens as I needed by catching them in my hands. The burrows in this meadow were on the little hillocks, the entrances near the top. Thus they are probably dry except in times of very high water. The entrances are perfectly open and not concealed under vegetation as is the habit of *Synaptomys cooperi* in the eastern States. Well-beaten runways extended out from the burrows and under the dead vegetation. A single specimen taken June 5 in an old dry meadow at Odin, Illinois, is provisionally referred to this form. It agrees with *gossi* in color, but its skull is too young to be positively identified.

At the time this species was described, only a few specimens were in existence and no skins were available. Since then the skins collected at the type locality by Goss have come to light and the Biological Survey has received six specimens from Fort Leavenworth, Kansas, collected by Dr. B. H. Dutcher. In view of the scarcity of this species and the lack of any description of its external characters, the following brief synopsis has been prepared:

Specific characters.—Size large and stocky—the largest of the genus; skull massive, larger than that of *helaletes* (much larger than *cooperi*) but with rostrum both actually and relatively narrower; colors dark.

Color.—Adults in full pelage (Kansas, April and June): rich reddish brown above, with an admixture of black hairs; sides paler; underparts

grayish, sometimes with a slight buffy or rufous tinge; feet and tail clothed with grayish hairs. A slightly worn April specimen is considerably paler than the rest.

The series of 12 specimens (mostly adults) from Horseshoe Lake, Missouri (April 21), average a little paler and less reddish than typical Kansas specimens, but agree with them in size and cranial characters.

Measurements.—Five adults from Fort Leavenworth, Kansas: total length, 132 (123–141); tail vertebrae, 21.4; (19–24); hind foot, 20 (19–21). Skull (3 adult males): occipito-nasal length, 29.9; zygomatic breadth, 17.9; interorbital breadth, 3.4; breadth of rostrum, 5.8; length of nasals, 8.2; maxillary toothrow, 7.5. Nine adults from Horseshoe Lake, Missouri: total length, 134 (131–138); tail vertebrae, 20.7 (20–22); hind foot, 19.5 (19–20). Skull (10 adults): occipito-nasal length, 28.6; zygomatic breadth, 17.6; interorbital breadth, 3.4; breadth of rostrum, 6; length of nasals, 7.6; maxillary toothrow, 7.8.

Geomys bursarius (Shaw).

POCKET GOPHER.

Efforts were made to trace the southern limit of this species in Illinois. It had been previously recorded from Belleville* and was found to occur very sparingly at Coulterville, Woodlawn, and Odin, and a few miles north of Olney. It does *not* occur on the prairie about Duquoin, so that Coulterville is considered to be about its southern limit in the State.

Sylvilagus aquaticus (Bachman).

SWAMP RABBIT.

This rabbit is numerous in the swampy bottoms of southeastern Missouri, western Kentucky, and southern Illinois. Its upper limit in Missouri is a few miles south of Cape Girardeau. In Illinois it ranges slightly farther north in a narrow belt of swamp close to the Mississippi River, to within a few miles of Grand Tower. In the Ohio Valley it is found in the swamps on both sides of the river to a point about five miles below Golconda, Illinois, and Berry Ferry, Kentucky, and is reported, also, from Gilbertsville, Kentucky, in the Tennessee Valley. Careful inquiries were made in the lower Wabash Valley to ascertain if this species occurred there, and I was positively assured by well-informed residents that it never was known in that region. With the exception of a few isolated areas of swamp land there is no country there suited to their habits.

Sylvilagus floridanus alacer (Bangs).

SOUTHWESTERN COTTONTAIL.

This form of the cottontail ranges north to southeastern Missouri and western Kentucky.

Specimens were taken at the following localities:

Missouri: Cushion Lake.

Kentucky: Berry Ferry.

* N. Am. Fauna, No. 8, p. 120, 1895.

Sylvilagus floridanus mearnsi (Allen).
NORTHWESTERN COTTONTAIL.

Specimens of this form were taken at the following localities:
Missouri: Horseshoe Lake, St. Charles County; Marble Hill.
Illinois: Kansas; Olive Branch.

Urocyon cinereoargenteus (Schreber).
GRAY FOX.

Gray foxes were reported to me as occurring at Midway, Kentucky, and Lick Creek, Illinois.

Vulpes fulvus (Desmarest).
RED FOX.

This species was reported to occur at the following localities:
Kentucky: Midway; Big Black Mountain, Harlan County (1908).
Illinois: Wolf Lake; Lick Creek (den of young found about May 20).

Canis sp.?
WOLF.

A few wolves are reported in the region about Cushion Lake, Missouri, and one was killed near there in the winter of 1908–9.

Canis latrans Say.
COYOTE.

I was informed by a resident of Kansas, Illinois, that several prairie wolves had been seen and one killed a few miles south of Kansas two or three years ago.

Spilogale putorius (Linnæus).
ALLEGHENIAN SPOTTED SKUNK.

The spotted skunks undoubtedly range north as far as southern Illinois. They were reported to be fairly common at Golconda, Illinois, and Berry Ferry, Kentucky. Hahn gives a record from Knox County, Indiana,* and they are said to occur at New Harmony.

Putorius noveboracensis Emmons.
NEW YORK WEASEL.

This weasel is fairly common in southern Illinois and Kentucky. Records were secured of its occurrence at the following localities:
Illinois: Golconda (3 specimens); Lick Creek.
Kentucky: Hawesville (1 specimen); Midway (1 specimen); Jackson.

Blarina brevicauda carolinensis (Bachman).
CAROLINIAN BLARINA.

Specimens of this form were taken at the following localities:
Illinois: Olive Branch, 2; Cypress Junction, near Shawneetown, 1; Golconda, 1.
Kentucky: Jackson, 1.

* Mamm. of Indiana, *loc. cit.*, pp. 575–577.

Scalopus aquaticus machrinus (Rafinesque).

PRAIRIE MOLE.

Moles are quite generally distributed in the Mississippi Valley, and in some sections are abundant. Records or specimens were obtained at the following localities:

Missouri: St. Francis River, west of Senath (a few occur); Portageville (common); Marble Hill (common; 1 specimen).

Illinois: Riehl Station, near Alton (common; 1 specimen); Olive Branch (common); Woodlawn (numerous); Olney (numerous; 1 specimen); Golconda (numerous).

Kentucky: Mammoth Cave (scarce); Hawesville (uncommon); Midway (abundant; 3 specimens).

Pipistrellus subflavus (F. Cuvier).

GEORGIAN BAT.

Generally distributed in the Mississippi Valley; very numerous in southern Illinois. Four small caves near Lick Creek, Illinois, were explored on May 22, but only about six bats of this species were found all told, all hanging singly. They were sluggish, cold, and very loath to move, even after being handled. All were males. No bats of any kind were found in Mammoth Cave at the time of my visit, although large numbers of *Myotis lucifugus* are known to live there in the winter. Nor were any of the latter species shot in the vicinity.

Specimens of *P. subflavus* were collected at the following localities:

Illinois: Olive Branch, 2 (May 14); Lick Creek, 4 (May 22); Olney, 1 (June 8); Reevesville, 1 (June 22).

Kentucky: Mammoth Cave, 1 (June 30).

Lasiurus borealis (Müller).

RED BAT.

Not very common; specimens were taken as follows:

Illinois: Olive Branch, 1 (May 14).

Kentucky: Mammoth Cave, 1 (July 1; two seen).

Nycticeius humeralis (Rafinesque).

RAFINESQUE BAT.

Specimens of this southern species were taken at the following localities:

Missouri: Cushion Lake, New Madrid County, 1 (May 6).

Illinois: Olive Branch, 4 (May 17, 18).

Kentucky: Mammoth Cave, 1 (June 30).

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

THE STRIDULATIONS OF SOME "KATYDIDS."*

BY H. A. ALLARD.

In the popular sense, the term "katydid" is applied to members of several different genera of the Locustidæ. These insects are more strictly arboreal than the rest of the Locustidæ, and in many ways show marked adaptation to arboreal conditions. Although of large size, the more or less oval outlines, the green color, and the leaf-like venation of the large wing-covers serve to harmonize them well with their environment of green foliage.

The katydids are nearly all nocturnal singers, and stridulate only rarely during sunshine. The species of katydids which I have met and with whose stridulations I have become acquainted are included in the four genera—*Scudderia*, *Amblycorypha*, *Microcentrum*, and *Cyrtophyllus*. Most species of these genera stridulate in a manner markedly different from others, so that far greater differences characterize their notes than is usual among the species of *Xiphidium*, *Orchelimum*, or *Conocephalus*.

In the first genus, *Scudderia texensis* Saussure and Pictet is one of the commonest and most widely distributed of all the katydids. It is not an arboreal species, but dwells almost entirely in the tall grass in neglected upland fields. At Thompson's Mills, Ga., where it is exceedingly common, it is almost entirely an upland insect. Here also it is a common dweller among cotton plants. Its stridulations, produced by a quick, shuffling wing-movement of brief duration, is soft, weak, and delivered at rather long and irregular intervals. It is usually heard during hazy afternoons and in the evening. It

* The katydids listed in this paper were kindly identified for me by Mr. A. N. Caudell, of the U. S. National Museum.

is a note difficult to express, but recalls the phrase, sh-sh-sh-sh-sh-sh-sh. *Scudderia texensis* is a shy species, and when flushed from the grass flies some distance, in a quiet, irregular flight. It is a common insect around Washington, D. C.

Scudderia furcata Brunner is also a very common species at Thompson's Mills, Ga., and also prefers the tall grasses, briars and weeds of upland fields, for it, too, is strictly a terrestrial species. At Thompson's Mills, in an old, abandoned field which had grown up to a dense growth of broom-grass and weeds, this katydid was extremely abundant in September and October. Its note is a rather soft *zeep*, uttered singly, or occasionally two or three times in succession. Like *texensis*, *furcata* is not a noisy or persistent singer, and its brief notes are uttered only at long and irregular intervals, in the afternoon or during the night. This species sometimes finds a hiding place among the foliage of an orchard tree, from which it produces its stridulations. *S. furcata* is a very common form around Washington, D. C.

The species of *Amblycorypha* stridulate much more noisily and persistently than the species of *Scudderia*. *Amblycorypha oblongifolia* De Geer is a fairly common species at Thompson's Mills, and stridulates almost entirely at night. In this locality I find it almost always among the weeds and low shrubs of upland situations. Here, my record of the first singer in 1909 was July 26. This large katydid is an especially common species on Plummer's Island, Maryland, where it usually prefers the willows and herbage close to the water. The note of *Amblycorypha oblongifolia* consists of a single, brief phrase repeated at more or less regular intervals. When heard close by, it is apparent that this note begins with a very rapid crepitation, which may be likened to the sudden rasping of an object across the teeth of a comb. This terminates sharply with a sound remotely like "itzic." The entire song may be likened to the syllables, z-z-z-z-itzic—z-z-z-z-itzic. At a distance, these notes recall the weak chirp of a small bird in the weeds,—itzic-itzic-itzic-itzic-itzic. *Amblycorypha oblongifolia* is a persistent singer, and is usually heard in rather definite colonies. Blatchley very aptly describes the note when he likens it to a "creaking squawk—like the noise made by drawing a fine-toothed comb over a taut string."

Amblycorypha rotundifolia Scudder is a smaller katydid than *A. oblongifolia*, and occurs around Washington, D. C. On the night of August 25, 1909, I caught a male of *A. rotundifolia* close to the ground on a dry, rocky, wooded hillside on Plummer's Island. Its stridulations were continued for some time while I closely observed it near by. Its song is brief, faint, and of the same lisping character as that of *Amblycorypha uhleri*, but entirely unlike it in delivery. Each phrase is a soft, shuffling noise repeated at intervals,—sh-sh-sh-sh—sh-sh-sh-sh—sh-sh-sh-sh. Scudder likens the notes to "chic-a-chee," several times repeated. In a study of the katydids occurring at Thompson's Mills, I have not yet obtained this species.

One of the commonest eastern katydids is the little *Amblycorypha uhleri* Brunner. This species is very common around Washington, D. C., and exceedingly common at Thompson's Mills, Georgia. Everywhere, it dwells not far from the ground in the tall grass and weeds of old fields and roadsides. The individuals of this species do not seem to congregate into well-defined colonies at all, but remain more or less evenly distributed throughout the fields. This katydid stridulates occasionally during the day, but usually at night. On warm, moonlight evenings its soft lisping responses are almost the dominant notes of the low weeds of the fields and roadsides. I have studied the notes of *A. uhleri* very carefully and find them quite variable.

The complete song begins with a prolonged, soft, silken, almost uniform noise produced by a rapid, shuffling wing movement. This note soon passes into a succession of short, vehement staccato lisps,—sip-itsip-itsip-itsip-itsip, and terminates with a rapid, shuffling sound two or three times repeated, sh-sh-sh-sh-sh-sh-sh—sh-sh-sh-sh-sh-sh. The complete song may be expressed, thus:—s-s-s-s-s-s-s-s-s-sip-itsip-itsip-itsip-itsip-sh-sh-sh-sh-sh—sh-sh-sh-sh-sh—sh-sh-sh-sh-sh-sh-sh. In some instances a succession of staccato lisps, tip-tip-tip-tip, very slowly repeated, follow the final phrases, sh-sh-sh-sh-sh-sh, recalling the lispings notes—tsip-tsip-tsip-tsip, in the song of an *Orchelimum*. Other individuals deliver only the lisping phrases, sh-sh-sh-sh-sh-sh, which are always preceded by an almost inaudible click of the wings. This song may be expressed as follows: tip-sh-sh-sh-sh-sh. If two males are

stridulating near each other, the responses are likely to be similar. If one singer begins its song with the soft, silken, continuous note, s-s-s-s-s-s-s-s-s, it is very quickly answered by the other in precisely the same way. The usual notes of *Amblycorypha uhleri* are, tip-sh-sh-sh-sh-sh-sh-sh, or this may be preceded by several short notes, slowly delivered, tip-tip-tip-tip-tip-tip—, sh-sh-sh-sh-sh-sh. The stridulations of this katydid have evidently never been completely described, as every part seems to be an essential love-call in its song.

The katydids of the genus *Microcentrum* are more strictly arboreal than any of the preceding. *Microcentrum retinerve* Burmeister is strictly an arboreal katydid, and dwells almost exclusively in the crowns of the highest oaks, hickories, maples and other deciduous trees. At Thompson's Mills, Ga., this katydid, judging from the numbers stridulating during warm, midsummer nights, is one of the commonest and most noisy of all the Locustidæ. Owing to its arboreal habits, however, it is not readily located and captured. Its notes, which are loud, harsh and persistently delivered throughout the summer nights, consists of several rapidly shuffled phrases, each briefer than the last—sh-sh-sh-sh—sh-sh-sh—sh-sh—sh. Wherever this katydid occurs, it is very locally distributed, so that certain groves are almost without a singer. This katydid is very common in the woods on Plummer's Island, Maryland, above Washington, D. C., but throughout the summer of 1909 I did not hear a single individual in the trees at Lincoln Park, although *Microcentrum rhombifolium* was very common there.

Microcentrum rhombifolium Saussure is the largest and one of the commonest katydids in much of the eastern United States. At Thompson's Mills this species is very common, and at Washington, D. C., I find it perhaps the commonest katydid. In the willows and small trees bordering the low grounds of east Washington, it is a very common species, and the strident calls of different individuals may be heard in nearly every bush. Although it is a rather shy species, with a little care it may readily be taken, since it dwells in low shrubbery in open situations, and is not a forest species.

I have carefully studied the peculiar stridulations of these katydids by placing them on boughs in my room. Throughout the night their crepitating notes were leisurely delivered in

response to others in the trees out-of-doors. The notes which show considerable variation in length and intensity are sharp, snapping crepitations, and sound much like the slow snapping of the teeth of a stiff comb as some object is slowly drawn across it. They may be more or less accurately expressed thus: tek-ek-ek-ek-ek-ek-ek-ek-ek-ek-tzip—tek-ek-ek-ek-ek-ek-ek-ek-ek-tzip. The first notes are very distinct and incisive, but grow fainter with a rapid decrease in the intervals separating each single syllable,—ek-ek, and terminate with a single, loud, rasping tzip. In some instances this tzip is followed by a succession of several barely audible clicks of the wings, tek-ek-ek-ek-ek-ek-ek-tzip-ek-ek-ek-ek. After dark on warm, summer evenings this katydid is a very persistent singer. Riley describes the notes of *Microcentrum rhombifolium* very accurately. He says: "The song consists of a series of from 25–30 raspings, as of a stiff quill drawn across a coarse file. There are about five of these raspings or trills per second, all alike and with equal intervals, except the last two or three, which, with the closing of the wings, run into each other. The whole strongly recalls the slow turning of a child's wooden rattle, ending with a sudden jerk of the same . . . . ."

The true katydid *Cyrtophyllus perspicillatus* Linnæus is also strictly an arboreal species. Its stridulations, which rarely begin before dusk, are probably the hardest and most rasping notes produced by any of the Locustidæ. At Thompson's Mills, Georgia, it is a very common species, and noisy colonies occupy nearly every wooded tract. In the evolution of this species, the power of sustained flight has been quite lost, so that when disturbed in its leafy hiding place among the topmost branches of the forest trees, it drops to a lower limb or sails gently to the ground. *Cyrtophyllus perspicillatus* is very sedentary in its habits, and shows little disposition to migrate, in part owing to its limited powers of flight. I have frequently noted that the same individual may occupy a certain tree or limb throughout the summer. This katydid is evidently generally distributed throughout the hill and mountain section of north Georgia, for even in the forests on Tray and Blue Mountains, Towns County, I heard their stridulations in late September.

The notes of this katydid are sharp, emphatic rasping sylla-

bles of a few seconds duration, usually from three to five following in rapid succession, with intervals of rest—kitzy-kitzy-kitzy-kitzy-kitzy—or kitzy-kitzy-kitzy. In the high forest trees throughout the little settlement of Thompson's Mills, Ga., the strident calls of this katydid may be heard above all other insects. Here, on warm, summer evenings, the quiet dusk is suddenly interrupted by the incisive notes of a single singer, and the din of the entire colony immediately starts up to continue throughout the night. It is also a noisy species in the trees on Plummer's Island, Maryland.

The stridulations of nearly all the katydids are harsh and unmusical reiterations, yet their lively notes add greatly to the life and buoyancy of the midsummer days and nights.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

NEW GENERA AND SPECIES OF ISSIDAE (FULGORIDAE).

BY E. D. BALL.

While collecting on a dry rocky slope in southwestern Utah several years ago, the writer beat from the scanty vegetation of this desert region three or four specimens of a very curious leaf hopper, evidently an Issid, but apparently representing an undescribed genus. The few specimens taken were apparently stray captures and no more were found in this region although diligent search was made on nearly every plant represented in the original locality.

The past season the writer came upon this insect again in two different regions in California. The first capture was on the Mojave desert and a little later the same insect was found near the Salton Sea. Both of these places are extreme desert regions and very similar in vegetation to the Utah region where it was first found. The insect, therefore, appears to be closely confined to the extremely hot, dry desert areas of the Southwest. It is much smaller and paler than its nearest relatives, no doubt an adaptation to the sparse, pale vegetation of its normal habitat. The genus is named in honor of Prof. Herbert Osborn, who has done so much to further our knowledge of the American leaf hoppers. The types of this and all other species here described are in the author's collection.

Osbornia gen. nov.

Somewhat resembling *Danepteryx* but with elytra oval and abbreviated, and the margin of vertex and front produced into a pair of acute horn-like angles above the eyes.

Vertex transversely concave, inclined, wider than long, anterior margin elevated, meeting the front in an acute angle which is accentuated at the lateral carinae, forming two acutely triangular "horns" nearly as high

as the width of an eye. The anterior margin of vertex broadly triangularly emarginate, posterior margin deeply roundingly emarginate. Front nearly horizontal, broad, convex below, slightly narrowing above to just before the apex where it expands into the horns. Median carina distinct and extending onto vertex. Clypeus strongly inflated.

Pronotum long on the median line, very narrow behind the eyes, median carina distinct, mesonotum tricârinate. Elytra brachypterous, oval, corium with three principal veins and irregular reticulations. Abdomen with the exposed segments strongly tubercularly elevated. Legs as in *Danepteryx*, posterior tibia with a single spine.

Type of the genus *O. cornuta.*

Osbornia cornuta sp. nov.

Superficially resembling *Peltonotellus histrionicus* somewhat, smaller than *Danepteryx*. A small brownish insect with abbreviated ashy gray elytra and acute outer angles to the vertex. Length, 3 mm.

Vertex twice wider than its length on lateral carinae. Four times wider than its median length. Lateral carinae distinct, elevated, meeting the lateral carinae of front in an acutely produced ear-like angle or horn. Between these horns the vertex is triangularly emarginate anteriorly. Front horizontal, one-third wider than its median length, margins nearly parallel, slightly constricted just beneath the lateral horns. Clypeus large, strongly inflated. Elytra abbreviate, roundingly truncate, usually slightly separated by the elevated abdomen. The last four abdominal segments with distinct tuberculate, median elevations.

Color.—Quite variable, usually dark brown with the ground color of the elytra and some stripes on the abdomen light. Front brown, the lateral carinae, a row of dots just inside these and a narrow crescent above the clypeus pale. Clypeus tawny or orange. Vertex brown, its carinae pale. Elytra ashy gray with the reticulate nervures brown, especially around the margins. Abdomen brown with five rows of irregular spots. Pale specimens are sometimes almost straw color with the clypeus and the tubercles on the abdominal segments reddish orange.

Described from twelve examples from St. George, Utah, and Mojave, California. Collected by the author.

Naso melichari sp. nov.

Closely resembling *robertsoni* in size and form. Smaller with the cephalic process less inflated at the apex. Pitchy black without markings. Length, 3.75 mm.

Vertex short transverse, sharply separated from the front by a distinct carina. Front broad at base, broader than in *fitchi*, tapering gradually into a long pointed snout as seen from above. The lateral carinae expanded just before the eyes, then contracted near the middle of the process, forming a somewhat diamond-shaped compartment, beyond this regularly narrowing to the apex. Median carina obscure on the disc, becoming prominent almost foliaceous around the extremity. As seen from the side

this protuberance is inclined at an angle of about forty-five degrees with the extremity rounded and enlarged. Pronotum large with anterior and median carinae prominent. Elytra rather narrow with a large number of irregular longitudinal veins. Abdomen narrow, the segments weakly pustulate.

Color.—Pitchy black, the posterior margin of the eyes fulvous, the rostrum and coxae white, and often a testaceous iridescence to the front and elytra.

Described from three females from Arizona in the collection of the author.

Hysteropterum unum sp. nov.

Resembling *cornutum* but larger and more strongly marked. Dirty straw marked with brown and green. Length, 4 mm.

Vertex two and one-half times wider than long, much longer and narrower than in *cornutum*, the anterior margin as seen from above straight, disc depressed, posterior margin slightly, roundingly emarginate. Front longer and narrower than in *cornutum*, the lateral carina straight to just before the clypeus where they round in a trifle. Union of front and vertex right angled, distinctly carinate; as viewed from the front this union is broadly angularly emarginate. Clypeus strongly obliquely ribbed and with a broad median carina. Pronotum long and narrow, nearly as long as the width of the vertex. Elytra longer than in *cornutum* and more definitely gibbous.

Color.—Vertex green, a pair of brown V-shaped marks in the posterior angles. Front pale green with irregular brown spots between the carinae. Clypeus orange. Pronotum and mesonotum pale green with traces of fuscous marking. Elytra pale straw, greenish at the hinge. A broad brownish stripe on either elytron, running back from the eye and enclosing a broad pale sutural stripe, which is angularly enlarged just before the apex of clavous.

Described from a single male from Pueblo, Colorado. Collected by the author. Readily recognized by its distinct vertex and elytral markings.

Dictyobia combinata sp. nov.

Slightly larger than *permutata* with longer less angled elytra. An oblique light stripe on each elytron. Length, 5 mm.

Vertex about six times wider than its median length with the margins strongly carinate. Front horizontal, slightly convex, a trifle widened between the antennae. Elytra decidedly longer and somewhat broader than in *permutata*. Much broader posteriorly, venation similar, the inner veins of corium much closer to claval suture.

Color.—Female sulphur yellow with the elytra brown. A pair of brown dots on the posterior part of the mesonotum. The brown of the elytra interrupted by a broad, definite oblique, subhyaline band arising on the middle of the clavus and extending to the costa beyond the middle. The anterior part of costal area and an oval area against the apex light. The

brown markings often accentuated against the oblique band. Male, uniformly darker with the same markings.

Described from five examples taken at Colfax, California, by the author.

Dictyssa ovata sp. nov.

Slightly smaller and darker than *areolata* with only three discal hyaline cells on elytra. Length, 3.5 mm.

Vertex narrow, anterior margin straight, carinate, meeting front in a right angle, slightly longer and more prominently angled than in *areolata*. Elytra with the two inner branches on the corium widely separated and curved to form an almost circular cell on the inner disc. In *areolata* and *mutata* the inner branch is not curved and the outer one less so than in the present species.

Color.—Face vertex and pronotum clear pale yellow, rarely obscured with smoky brown. Elytra varying from dark brown to almost black with the anterior half of the costa light, interrupted with transverse brown nervures. Posterior half of costa and entire apical margin and most of the sutural margin ornamented with small semicircular pellucid spots. Disc of corium with three milky-white subhyaline cells in an oblique band, the median cell much the larger, almost circular, and its margin studded with about eight short, dark nervures. Inner hyaline area irregular, much smaller, usually extending across the suture onto the clavus, and often partially or wholly divided by a cross nervure. Outer cell nearly pentagonal in outline, scarcely two-thirds the size of the middle one and usually more than its own width removed from the spots along the costa.

Described from eight examples from Ti Juana, Mexico, and Tia Juana, California, collected by the author. Closely resembling *areolata* but easily separated by the smaller size and the abbreviated oblique marking of the elytra which does not reach the costa.

Dictyssa fenestrata sp. nov.

Resembling *ovata* in form, slightly smaller. Brown with two transverse bands of hyaline spots behind the middle of the elytra. Length, 3 mm.

Vertex slightly longer and narrower than in *ovata*, with the carinae more elevated. Elytral venation similar to *ovata* but with the first two sectors of the corium less widely separated as in *mutata*, and with a smaller number of reticulate veinlets, especially towards the apical portions.

Color.—Pale dirty brown. Elytra brown with the nervures mostly pale. Costal and sutural margins bordered with small pale spots. An oblique hyaline band from the base of clavus to center of corium. A transverse hyaline band just back of the middle of corium made up of five or six angular cells, another transverse band across the apex composed of three or four large oval hyaline cells and about the same number of minute round ones against the margin between the larger ones.

Described from six examples from Tia Juana, California, collected by the author. A very distinct species and one easily recognized by the large hyaline cells at the apex.

Dictyssa obliqua sp. nov.

Size and form of *fenestrata* nearly but much darker, venation and oblique band as in *mutata* nearly. Dark brown or black with an oblique band and marginal spots on the elytra hyaline. Length, 3 mm.

Vertex and pronotum black, the margins pale. Median carina definitely white lined, face brown or pale brown, the carinae margined with fuscous. Elytra black, an oblique hyaline band from the posterior disc of clavus to the middle of the corium, then angled to the costa as in *mutata*, the two outer cells oval and smaller than those on disc. Entire margin of elytra sparsely ornamented with pellucid dots, the largest ones around the apex.

Described from twelve examples from Tia Juana, California, and Ti Juana, Mexico, collected by the author. This is the only dark species of the genus that has the oblique band.

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THE SCALES OF THE ATHERINID FISHES.

BY T. D. A. COCKERELL.

When examining the scales of various Acanthopterygians, it was observed that those of the Scombrids differed so greatly from those of the Percoids that it was hard to understand how one could have been derived from the other. The typical Percoid scale (e. g. that of *Perca fluviatilis*) has very strong basal radii, the inferior margin being scalloped or crenulate. Scales of this type may be cycloid or ctenoid, but their general character remains the same. In *Scomber* the broad scale has no basal radii whatever, and the lower margin is not scalloped. It chanced that among some fishes of unknown locality, long preserved at the University of Colorado, I found a couple of Atherinidæ. The examination of their scales at once revealed the fact that they were (in respect to the squamation) exactly intermediate between the Scombrids and Percoids; in fact the different scales on the same fish virtually bridged the gap which had seemed so great. Through the kindness of Dr. Evermann and the Bureau of Fisheries, I have now been supplied with four species of Atherinidæ, having authentic names and localities, and it seems worth while to report the results of their examination. The Atherinid scale (from the middle of the side) is broader than long, and in general very much like that of the Scombrids. In *Kirtlandia laciniata* the scales from the position mentioned have no basal radii, although the base is wavy or subplicate; but the scales of the caudal peduncle show strong basal radii. The diagnostic characters are as follows:

(1.) *Kirtlandia laciniata* Swain. Chesapeake Bay, Va. (Grampus Sta. 4). Scales nearly 3 mm. long, a little over 4 broad: apical margin thin, strongly irregularly crenate, with rudimentary radii; apical

field without circuli; basal and lateral fields with strong circuli, not very dense (least so laterally); basal margin with a prominent median lobe, bounded on each side by a shallow fold, but no basal radii. Scales of caudal peduncle similar but nearly square, with strong laterobasal angles, and five strong basal radii. The scales are very suggestive of those of *Scomber chrysozonus* (probably better called *Rastrelliger chrysozonus*, as I learn from Dr. Jordan), but the latter has no basal lobe, and has strong transverse circuli in the apical field. In general, however, the resemblance is most striking.

(2.) *Menidia menidia* (L.). Cape Charles City, Va., above mouth of King's Creek. Scales (from the usual situation on middle of side) about $2\frac{3}{4}$ mm. long and $3\frac{1}{3}$ broad; nucleus central; apical margin simple, entire; no apical radii; apical field with dense rather ill-defined circuli; lateral field with widely spaced circuli; basal field with strong circuli and 8 or 9 strong radii, which, however, do not nearly reach the margin; basal lobe slightly indicated. Scales from caudal peduncle nearly square with strong posterior corners and numerous strong basal radii.

(3.) *Menidia notata* (Mitch.). Wareham River, Mass., practically in fresh water. Scales hardly 2 mm. long, about $2\frac{1}{4}$ broad; formed as in *M. menidia*, except that there are about 8 strong basal radii, which reach the margin, producing the characteristic scalloping. Scale from caudal peduncle differing as in the others.

(4.) *Menidia peninsulæ* (Goode and Bean). Sebastian River, Fla. (Pelican Islands). Scales about 2 mm. long and $2\frac{3}{4}$ broad; structure as in the other species of *Menidia*, except that the basal radii (7 or 8), while reaching the margin, which they irregularly scallop, fail centrad, being in general less well developed than those of *M. notata*. Scale from caudal peduncle differing as in the others.

Kirtlandia and *Menidia* offer excellent generic differences in their scales; *Kirtlandia* is, of course, the more *Scomber*-like.

The Atherinidæ belong to the Percesoces, a suborder of which Jordan and Evermann say: "The suborder marks a transition from soft-rayed to spiny-rayed fishes, its nearest associates among the latter being, perhaps, the Scombrid forms." The Scombriform character of the scales, with a combination of Perciform features, is therefore of much interest.

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THE WEST AFRICAN FOREST PIG (*HYLOCHOERUS RIMATOR* THOMAS).

BY GLOVER M. ALLEN.

Through the generosity of Col. William Barbour, the Museum of Comparative Zoology has recently received a skin and skull of the West African Forest Pig (*Hylochoerus rimator*). I am indebted to the authorities of the Museum for permission to make a brief report on this interesting specimen, the first of its kind, apparently, to reach America. Reports had for some years previously been current of a "Giant Pig" inhabiting the forests of Equatorial Africa, but it was not until 1904 that actual specimens were obtained from British East Africa and sent to the British Museum. These, consisting of two skulls, an imperfect skin, and a fragment of hide, were made the basis of the new genus and species *Hylochoerus meinertzhageni* by Thomas.* A number of specimens of this species have now reached European museums, so that it is fairly well known as regards external and cranial characters. In 1906 Thomas† described a second species, *H. rimator*, from the Ja River, Cameroons, West Africa. This was based on a single skull of a female specimen, and hitherto no notice has appeared of the external characters nor have other skulls apparently reached museums. The following notes are therefore offered regarding the Forest Pig in the Museum of Comparative Zoology, and are of particular interest since the specimen is a topotype, obtained at the Ja River, Cameroons, by Mr. G. L. Bates, the same gentleman who procured the type skull.

Color.—The muzzle is thickly covered with short black bristles some 10 mm. long, which increase in length posteriorly becoming about 25 mm. in length on the cheeks. The entire edge of the ear is fringed with long

* Thomas, O. Proc. Zool. Soc. London, 1904, Vol. 2, pp. 193-199, pls. 14, 15.

† Thomas, O. Proc. Zool. Soc. London, 1906, pp. 2, 3, figs. 1, *a*, *b*.

black bristles which reach a length of 50 mm. at the apex; the posterior surface has a very few scattered fine black bristles, but is otherwise practically bare. The body is covered with coarse black bristles which are longest on the neck and the dorsal ridge. The longest neck hairs measured 164 mm., those on the middle area of the back, 132 mm. The fore and hind legs are furnished with shorter bristles, from 10 to 20 mm. long. On the ventral surface of the body, scattered among the sparse black bristles are others of a pale cinnamon color or "yellowish white." Similar light-colored hairs are present on the inner side of the fore legs and thighs, and on the anterior edge and proximal two-thirds of the inner portion of the ears. At the corner of the mouth on each side is a patch of these light bristles for a length of about 65 mm., and a conspicuous tuft of the same along the posterior angle of the mandible, extending vertically some 45 mm., with a width of about 10 mm. The hoofs are smooth and blackish.

The skin is dark gray and rough, but there are no very definite warts on the face, except that below the ear, along the posterior angle of the mandible, is a thickened crescentic area on which grows the tuft of light bristles, in much the same position as a similar tuft in the Wart Hog (*Phacochoerus*). The tail is laterally compressed and bears a few small scattered black hairs, except along its dorsal and ventral edges, which for their terminal 55 mm. have a stiff crest of close-set black bristles the longest of which, at the tip of the tail, attain a length of some 30 mm.

Measurements of the skin.—The skin, preserved in brine, when straightened out, was found to measure approximately 1,500 mm. in total length, of which the tail is about 250 mm. The following additional measurements were made: Greatest transverse diameter of snout (*rhinarium*), 105 mm.; greatest vertical diameter, 57; distance between nasal apertures, 42; ear from meatus, 119; greatest breadth of ear, 91; median length of hoof of fore foot, 41; of dew claw, 41.5; median length of hoof of hind foot, 39; of dew claw, 35.

Skull.—The skull appears to be that of a nearly full-grown animal, doubtless a female, and is even smaller than the type specimen as indicated by the measurements. The last molars are just erupted and unworn. They are not so narrowed posteriorly as those figured by Thomas, but are bluntly rounded. Following are the measurements of this skull, with the corresponding dimensions of the type in parentheses: Median occipitonasal length, 325 mm.; basal length, 279 (325±); palatal length, 196 (232); greatest length of nasals, 182 (191); greatest width of combined nasals posteriorly, 48 (42); greatest width between postorbital processes, 106; least interorbital width, 78 (88); least width between orbit and canines, 53; width at vertex, 90; orbit to tip of nasals, 213; height of muzzle in front of premolars, 65 (57); least breadth of maxillary zygomatic processes below orbit, 39 (42); least vertical breadth of zygomata behind true orbit, 34.5 (36); palatal width between posterior ends of m^3, 52; mandible from condyle to tip of i_1, 277; depth of jaw at diastema, 42; width across sockets of canines, 97 (98); breadth between tips of canines, 163 (181); greatest diameter of canines, 25 (24); upper molar

row, 93; upper molar row from in front of pm^3, 80 (97); lower molar row, 89; lower molar row from in front of pm_4, 81 (99); last upper molar, 32.5 x 17 (42.3 x 17.5); penultimate upper molar, 19 x 14.5; last lower molar, 37 x 16 (48.2 x 16); penultimate lower molar, 21.5 x 12; lower diastema between premolars and canine, 51; between lower canine and incisor, 14.

The persistence of the milk pm^4 in the upper jaw was noted by Thomas in his specimen, and a similar condition is found in ours. In front of it are pm^2, pm^3, while wedged between them on both sides of the jaw is a minute splint evidently representing a persistent root of milk pm^3.

In the Musée du Congo at Bruxelles are skins and skulls of a young female, a semi-adult, and an adult male Forest Pig from the Ituri Forest of Central Africa, which have been made the subject of an elaborate monograph by Matschie.* He figures the exterior and skulls of these specimens and considers that they represent a species distinct from the two before described, which he therefore names *Hylochoerus ituriensis*. It is apparently identical in color with *H. rimator* and *H. meinertzhageni*, but according to the describer, its skull shows certain peculiarities, chief of which are the following: (1) the salient crest from foramen magnum to vertex is much less marked than in the latter; (2) the zygomata are less bowed; (3) the nuchal plane at the posterior end of the skull is deeper; (4) the occiput is not directed backward so much as in *meinertzhageni;* (5) the canines are less curved at the tip and more pointed; (6) the angle made by the frontals with the nasals is slightly less; (8) the height of the lower jaw at the diastema is *less* than the least width of the palate, instead of being at least as great as is the case in the East African species.

Professor Matschie believes that the Ituri Pig can not be *H. rimator* because of the dimensions of the last upper and lower molars, which in two adults are respectively 39.6 and 40.3 x 19; and 42.5 and 43.5 x 16. Thomas gives for the type of *rimator* 42.3 x 17.5 and 48.2 x 17 for these dimensions, a difference not very great. The Ituri Pig's upper molar row measures in two adults, 90, 91.5; the lower molar row, 83.3, 90.5; those of our specimen are, 93 and 89 respectively. Matschie further states that in *rimator* and *meinertzhageni* the tubercles of m^3 forming the anterior angles of the two middle triangles do not touch, whereas in *ituriensis* they are in contact. In our specimen of *rimator* these tubercles are, however, in close contact. Apparently *ituriensis* is more nearly allied to *rimator* in size and cranial characters than to *meinertzhageni* and it may be questioned whether the characters claimed for it are really sufficient to warrant its recognition. At least it can be hardly more than subspecifically distinct.

That the term "Giant Pig" applied to these animals is a misnomer is now well recognized, for they are in reality not remarkably large, though standing fairly high. Photographs of living specimens of the East African *meinertzhageni* have recently appeared in the "Proceedings of the Zoological Society of London," 1908, part 1, p. 203, and in "Collier's Weekly," 1909 (article by A. R. Dugmore).

* Matschie, P. Ann. Mus. du Congo, Bruxelles, 1906, Zool. ser. 5, p. 23, pls. 5, 11o.

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PROCEEDINGS

OF THE

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DIAGNOSES OF NEW FORMS OF MICROPODIDÆ AND TROCHILIDÆ.

BY ROBERT RIDGWAY.

[By permission of the Secretary of the Smithsonian Institution.]

Streptoprocne zonaris mexicana subsp. nov.

Type from Rio Seco, near Cordova, Vera Cruz, Mexico. No. 41,636, U. S. Nat. Mus. Adult male. January, 1866, Prof. F. Sumichrast.

Similar to *S. z. albicincta* (Cabanis), of Costa Rica and northern South America, but averaging larger, general coloration decidedly duller (less bluish) black, and forehead always distinctly grayish sooty. Adult male (type): Wing, 207.5 mm.; tail, 83; exposed culmen, 10; tarsus, 22.5; middle toe, 15.

Chætura richmondi sp. nov.

Type from Guayabo, eastern Costa Rica. No. 209,570, U. S. Nat. Mus. Adult female. March 5, 1908. Museum-Zeledón Exped.

Similar to *C. gaumeri*, of Yucatan, but larger and coloration darker, the pileum and back more nearly black; spiny tips to rectrices longer, always well developed. Adult female (type): Wing, 115 mm.; tail, 37.5; exposed culmen, 4.5; tarsus, 10.5; middle toe, 8.

Cypseloides niger jamaicensis subsp. nov.

Type from Mayfield, St. Andrews, Jamaica. No. 78,205, U. S. Nat. Mus. Adult female. June 25, 1879, Edward Newton.

Similar to *C. n. niger*, of Santo Domingo, but much darker (especially the adult female), the upper and under parts sooty black, more or less distinctly (but not conspicuously) paler or more grayish sooty on chin, throat, and chest. Adult female (type): Wing, 149.5 mm.; tail, 64.5; exposed culmen, 5.5; tarsus, 11.5; middle toe, 9.5.

Cypseloides niger costaricensis subsp. nov.

Type from San José, Costa Rica. No. 108,275, U. S. Nat. Mus. Adult male? May 10, 1885, José C. Zeledón.

Similar to *C. n. borealis*, of western North America, but smaller and decidedly darker, the adult female with feathers of abdomen and flanks

usually more broadly tipped with white; adult male similar to that of *C. n. jamaicensis*, but wing averaging longer and tail decidedly shorter, and general color of head and neck decidedly more grayish. Adult male? (type): Wing, 155 mm.; tail, 57; exposed culmen, 6; tarsus, 12; middle toe, 9.

Phœthornis longirostris veræcrucis subsp. nov.

Type from Buena Vista, Vera Cruz, southeastern Mexico. No. 177,330, U. S. Nat. Mus. Adult male. May 23, 1901, A. E. Colburn.

Similar to *P. l. mexicanus* (of southwestern Mexico) in white (instead of buff) terminal margins to lateral rectrices, but much smaller, and paler in coloration. Adult male: Wing, 60–65.5 (62.9) mm.; tail, 65–70 (67.9); culmen, 39–42.5 (40.3).*

Phœthornis adolphi saturatus subsp. nov.

Type from El Hogar, Costa Rica. No. 26,741, coll. Carnegie Museum. Adult male. December 19, 1905, M. A. Carriker, Jr.

Similar to *P. a. adolphi* (from southern Mexico), but adult male decidedly darker, especially chin, throat and chest, the first being distinctly dusky.

Guatemala to Panama. (Guatemalan specimens are intermediate, but seem to be more like those from Costa Rica than like those from Mexico.)

Eupherusa eximia nelsoni subsp. nov.

Type from Motzorongo, Vera Cruz, Mexico. No. 155,363, U. S. Nat. Mus. (Biological Survey Coll.) Adult male. February 28, 1894, Nelson and Goldman.

Similar to *E. e. eximia*, but larger, especially the bill; green of underparts more yellowish, and black tip to lateral rectrices with line of demarcation against the basal white decidedly oblique and much less sharply defined.

Adult male.—Length, 93–103 (98) mm.; wing, 60.5–61 (60.7); tail, 34–35.5 (34.7); culmen, 18.5–19 (18.7).†

Amizilis bangsi sp. nov.

Type from Volcan de Miravalles, northwestern Costa Rica. No. 16,682, coll. E. A. and O. Bangs. Adult male. September 7, 1895, C. F. Underwood.

Similar to *A. cinnamomea cinnamomea*, but whole side of neck, including lateral portions of lower throat, metallic greenish bronze or bronze-green instead of light cinnamon-rufous.

*Adult males of *P. l. mexicanus* measure as follows: Wing, 67–69.5 (68.1); tail, 83–87 (84.6); culmen, 45.5–47 (46.1).

†Two specimens. The corresponding measurements of a series of eleven adult males of *E. e. eximia* (ten from Guatemala, one from Nicaragua) are as follows: Length, 84–93 (89); wing, 56.5–64 (58.7); tail, 32.5–34.5 (33.5); culmen, 16–19 (17.6).

Anthracothorax prevosti gracilirostris subsp. nov.

Type from Bolson, Costa Rica. No. 22,629, coll. E. A. and O. Bangs. Adult male. December 16, 1907, C. F. Underwood.

Differing from *A. p. prevosti* in decidedly shorter and more slender bill, less bronzy or golden green upper parts, and darker under tail-coverts; from *A. p. hendersoni* in more slender bill and very much less bronzy color of upper parts and lateral under parts.

Costa Rica and Nicaragua.

Average measurements of the three forms are as follows:

Males.

A. p. prevosti (24 specimens) .	66	35.6	26.2
A. p. gracilirostris (9 specimens) .	65.9	35.3	24.4
A. p. hendersoni (4 specimens) .	67	36.7	22.9

Females.

A. p. prevosti (15 specimens) . .	64.7	34.3	28.1
A. p. gracilirostris (10 specimens)	65.2	35.4	25.4
A. p. hendersoni (2 specimens) .	66.2	35	22.7

Florisuga mellivora tobagensis subsp. nov.

Type from Tobago. No. 74,908, U. S. Nat. Mus. Adult male. F. A. Ober.

Similar to *F. m. mellivora*, but decidedly larger.

Measurements of type.—Wing, 70.5; tail, 38.5 mm.

Nesophlox gen. nov. (*Trochilidæ*).

Type.—*Trochilus evelynæ* Bourcier.

Similar to *Calliphlox* Boie, but wing relatively much larger, with outermost primary not attenuated terminally; adult males with lateral rectrices broadly edged with rufous on inner webs, and adult females with tail more than half as long as wing.

(νῆσος, island; φλόξ, a flame.)

Species:

Nesophlox evelynæ (Bourcier).
Nesophlox lyrura (Gould).
Nesophlox bryantæ (Lawrence).

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PROCEEDINGS

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BIOLOGICAL SOCIETY OF WASHINGTON

THE GENERIC NAME OF THE HOUSE-RATS.

BY GERRIT S. MILLER, JR.

The generic name *Mus* is currently applied to both house-mice and house-rats, as well as to an assemblage of rat-like species comprising perhaps the greater part of the sub-family *Murinæ*. This arrangement involves many inconsistencies, the most glaring of which is probably the close association of the house-mice with the rats. The two groups are in fact generically distinct, the rats retaining a primitive type of dentition, in which the anterior molar shows no tendency to assume the chief function of the toothrow, and the posterior molar remains a large, functionally important tooth, while the house-mice and their allies have a highly specialized toothrow in which the first molar is of much more mechanical importance than the other teeth combined, and the third tooth is greatly reduced. The incisors in the house-mouse group are also noticeably specialized. With the house-mice and their European and Central-Asiatic allies must be associated the Indian and African group commonly known as *Leggada*, the main peculiarities of which are precisely the same. In its most extreme development *Leggada* differs from the house-mice in the more pronounced reduction of the hinder molar and in the further enlargement of m^1 by the addition of a supplemental anterior transverse enamel ridge; but on taking into consideration the numerous recently described species it seems impracticable to retain the two groups as distinct genera.

The type of the Linnæan genus *Mus* is by tautonymy *musculus*, since this is the only included species "possessing the generic name as * * * [a] synonym."* This name must therefore be restricted to the house-mouse-*Leggada* group.

* International Code, article 30.

In determining the generic name of the rats, as typified by the species *norvegicus* and *rattus*, and without, for the present, attempting to fix any exact limit for the group, it is necessary to consider the genera *Acanthomys* Lesson, *Euchætomys* Fitzinger, and *Epimys* Trouessart, each of which as originally defined contained species related to the house-rat.*

Acanthomys was proposed† as a subgenus of *Mus* to contain the species *retifer*, *alexandrinus*, *perchal*, *platythrix* and *hispidus*.† No type was designated nor has one been selected by a subsequent reviser. As the name has, however, generally been placed in the synonymy of *Acomys* I. Geoffroy, it may be allowed to remain there, with the species *hispidus* as type.

Fitzinger‡ united under the generic name *Euchætomys* the following species: *palmarum*, *noraræ*, *retifer*, *perchal*, *kok*, *hardwickii*, *rufescens*, *ellioti*, *lepidus*, *vittatus*, *pumilio*, *parduleus*, *zebra* and *donovani*. No type was designated and none has been selected. Since the description indicates that the group was primarily intended to contain the coarse-furred species, as distinguished from the true rats (*Rattus*) on the one hand and the spiny rats (*Acomys*) on the other, I have no hesitation in referring it to the synonomy of *Nesokia* Gray, 1842, and in choosing the species *hardwickii* as the type.

In 1881 Trouessart§ formed the subgenus *Epimys* for the true rats including both *rattus* and *norvegicus*. He designated no type and none has since been selected. As this group exactly coincides with the genus now under consideration the name should be adopted for the rats congeneric with *Mus rattus* Linnæus, the species which I choose as type.

The synonymy and characters of the genera *Epimys* and *Mus* are briefly as follows:

GENUS EPIMYS Trouessart.

1867. *Rattus* Fitzinger, Sitzungsber. Math.-Naturwiss. Cl. k. Akad. Wissensch. Wien, LVI, pt. II, p. 63 (type by tautonomy *Rattus domesticus* Fitzinger = *Mus rattus* Linnæus) not *Rattus* Donovan, 1827.

* *Rattus* Fitzinger, Sitzungsber, Math.-Naturwiss, Cl. k. Akad. Wissensch, Wien, LVI, pt. II, p. 63, type by tautonomy *Mus rattus* is antedated by *Rattus* Donovan, 1827, applied to a South African striped rat. *Rattus* Frisch, 1775, has no status in nomenclature.

† Nouv. Tabl. Règne Anim. Mamm. p. 135. 1842.

‡ Sitzungsber, Math.-Naturwiss, Cl. k. Akad. Wissensch. Wein, LVI, pt. II, p. 73. 1867.

§ Bull. Soc. d'Etudes Sci. d'Angers, X, p. 117. 1881.

1881. *Epimys* Trouessart, Bull. Soc. d'Etudes Sci. d'Angers, X, p. 117 (type by subsequent designation *Mus rattus* Linnæus).

External form, skull and teeth with no special modifications; molars slightly graduated in size from first to third, the anterior tooth not tending to assume the main function of the toothrow, the posterior tooth not tending to disappear, enamel folding of upper molars directly referable to a simple 9-cusped pattern and its reductions, the outer margin of m^1 and m^2 never with more than three cusps, the inner margin of same teeth never with more than 2 cusps; m^1 usually with 5 roots, its first lamina not distorted by the backward displacement of antero-internal tubercle; upper incisor moderately compressed, set at such an angle that its outer side is worn smoothly away by action of lower tooth.

Genus MUS Linnæus.

1758. *Mus* Linnæus, Syst. Nat., I, 10th ed., p. 59 (*musculus*). Part.

1814. *Musculus* Rafinesque, Précis des Découv. Somiologiques, p. 13 (substitute for *Mus*).

1837. *Leggada* Gray, Charlesworth's Mag. Nat. Hist., I, p. 586. November, 1837 (*L. booduga* Gray and *Mus platythrix* Bennett).

1844. *Drymomys* Tschudi, Fauna Peruana, p. 178 (*D. parvulus* Tschudi = *Mus musculus* Linnæus. See Palmer, Index Gen. Mamm., p. 246).

1876. *Nannomys* Peters, Monatsber. k. preuss. Akad. Wissensch. Berlin, p. 480, August, 1876 (*N. setulosus* Peters).

1881. *Acromys* Trouessart, Bull. Soc. d'Etudes Sci. d'Angers, X, p. 133 (synonym of *Drymomys* wrongly attributed to Wagner. See Palmer, Index Gen. Mamm., p. 246).

1896. *Pseudoconomys* Rhoads, Proc. Acad. Nat. Sci., Philadelphia, p. 531, December 8, 1896. *Mus* (*Pseudoconomys*) *proconodon* Rhoads.

1900. *Dryomys* Philippi, An. Mus. Nac. de Chile, XIV, p. 20 (modification of *Drymomys* Tschudi).

In general like *Epimys* but mechanical scheme of molars modified by the elongation of crown of anterior tooth until it forms the main portion of toothrow; m^1 with three roots, its crown decidedly longer than those of the two succeeding teeth combined, its first lamina much distorted by displacement backward of inner tubercle into line with outer and middle tubercles of second lamina; m^3 small and tending to disappear, in some species without trace of first lamina; upper incisor much compressed, set at such an angle that a subapical notch is normally cut in its outer side by action of lower tooth.

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PROCEEDINGS

OF THE

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THE SCALES OF THE CLUPEID FISHES.

BY T. D. A. COCKERELL.

The scales of an ordinary Clupeid are very thin, more or less circular, and very finely sculptured. In *Alosa sapidissima* they vary from longitudinally to transversely oval on different parts of the same fish, while the larger and best developed scales (about 16 mm. each way) are subquadrate. A closer examination of the scales of *A. sapidissima* shows the following features: Apical field sharply separated from the rest, much broader than long, without circuli, but with very numerous (2½–3 in a mm.) delicate radii or grooves, which scallop the apical margin, and have between them on that margin a series of low lobes or angles, making the scale obscurely ctenoid; these lobules or denticulations can also be seen more or less clearly repeated once or twice in the submarginal area, marking periods of cessation of growth, and indicating the process whereby the rows of spines in the apical field of a *Beryx* scale are formed. Delicate lines of growth can be seen also in the other parts of the scale, but they have nothing to do with the circuli, which exist as exceedingly fine lines (about six in 170 μ) all over the scale except in the apical field. These circuli are transverse in the middle and reach the lateral margins very obliquely. The basal region of the scale is inclined to be thrown into three radiating folds, suggesting a slight approach to the basal radii of the Percoids, etc., but these folds are not marked by any signs of radii.

The most striking feature of the scale remains to be mentioned. Everywhere except in the apical field, at variable intervals averaging perhaps half a mm., there are grooved lines crossing the scale, approximately following the circuli, bent on the elevations between the basal grooves or folds, and curving

upwards to reach the margin at an acute angle. At first sight the nature of these structures seems wholly obscure, but in a longitudinally oval scale, probably from the caudal peduncle, it is seen that they pass gradually into apical radii. The first stage of modification is that in which the apical radii on each side of the middle become elbowed or curved at the base, forming a sort of J. In *Catostomus* the *basal* radii show this condition, and the tendency is for the curved part of the J to disappear, leaving radii which no longer point to the nuclear area. In *Alosa* this curving of the apical radii continues until a U rather than a J is formed, one arm of the U now pointing apicad to the nuclear area. Then the inner arm loses all connection with the nucleus, and those of opposite sides meet at an acute angle, forming a sort of reversed V. From this it is a comparatively short step to a single line running transversely across the scale. All this is complicated, especially in some scales, by various degrees of anastomosis, and the frequent disappearance of the inner part of the line. Nevertheless, by taking different scales from a single example of the *Alosa*, it is possible to demonstrate every transition from apical radii to transverse lines *below* the nuclear area; the conclusion being that these lines, which I have found only in Clupeidæ, are really greatly modified apical radii. Dr. Evermann kindly sent me some scales of very young *Alosa sapidissima* from the fish ponds at Washington, D. C. These scales, only about 2 mm. diameter, do not look like those of the adult, but they correspond exactly with the nuclear region of the latter. They show a strongly differentiated sculptureless apical field; the rest of the scale is covered by very fine wholly *transverse* circuli, and exhibits two or three of the lines representing modified radii, which are transverse, more or less bent apicad and obtusely angled in the middle. Thus the young scale does not throw any light on its evolution, and is, taken by itself, much more difficult to interpret than that of the adult. I am indebted to Dr. B. W. Evermann and Dr. S. Graenicher for other Clupeid scales, which all possess the same essential features as those of *Alosa*. They may be described as follows:

(1.) *Clupea harengus* L. Sandy Island. Scales about 8 mm. long and $7\frac{1}{3}$ broad; structure as in *Alosa*, the apical radii feeble, the trans-

verse circuli reaching the margin at a larger angle, the transverse radii (if they may be so called) essentially as in *Alosa*. There is no generic difference from *Alosa* in squamation.

(2.) *Sardinella humeralis* C. & V. Tampa, Fla. (Milwaukee Museum). Scales about 4 mm. broad and 3 long, with evident laterobasal angles. Scale formed and sculptured as in young *Alosa*, except for its much greater breadth, and some crenulation of the very thin apical margin, with rudimentary radii. There are three transverse radii, but the third presents only its middle part, running into the margin where it is concave. The circuli are strictly transverse, most reaching the margin practically at a right angle. If these scales are not immature, they at any rate represent a stage corresponding with immature *Alosa*, but not in any sense primitive.

(3.) *Pomolobus pseudoharengus* (Wilson) and *P. æstivalis* (Mitch.) both from six miles off Liverpool, N. S. Large yellowish scales, 10 or 11 mm. broad, but those of *P. pseudoharengus* more transverse, evidently broader than long, those of *P. æstivalis* about as broad as long. The markings are quite the same, and of the *Alosa* pattern; corresponding, however, to a rather immature stage of *Alosa*.

(4.) *Pomolobus pseudoharengus* (Wilson). Lake Ontario, Monroe Co., N. Y. Colorless scales little more than 4 mm. broad, evidently immature. I do not know any way to distinguish them from young scales of *Alosa*.

Thus the Clupeid scales so far examined are exceedingly uniform, and exceedingly distinct from all others I have seen. I have also examined *Knightia eocæna* Jordan, from the Eocene of Green River, Wyoming. In this the scales are large and very broad, and show the characteristic transverse circuli very well. I can not make out any radii, transverse or otherwise, but the thin edges of the scale are not preserved. *Meletta sardinites* Heckel, a fossil species from Radoboj, is figured as having the scales with three or four very strong apical radii, and the same basal. This can not be a *Meletta* (i. e. *Pomolobus*) or a *Clupea;* it has no resemblance to any Clupeid known to me.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

A NEW BIRD FROM THE ISLAND OF CERAM, MOLUCCAS.

BY F. MUIR AND J. C. KERSHAW.

While collecting in the Dutch East Indies a new *Pitta* was captured which may be known as

Pitta piroensis sp. nov.

Type.—An adult male from Piroe, Ceram, Museum of Comparative Zoology, Cat. No. 49,997, collected by the authors, March 2, 1909.

Description.—Forehead and upper part of head and neck dark red-brown, the crown divided by an obscure median bluish stripe: a large sub-quadrangular scarlet nuchal patch. Throat dark brown, shading into black on upper part of breast. Ear coverts and lower part of breast silvery blue-gray. Back and scapulars dark olive green. Tail and upper tail coverts grayish-blue. Bend of wing nearly black, feathers lighter round edge; lesser coverts blue-gray, the feathers dark brown at base; greater coverts very dark brown, edged and tipped with dark blue-gray. Primaries nearly black, the 2d, 3d, 4th and 5th with a white speculum marking, but only the 4th and 5th have the white on the upper side of the outer web. Under wing-coverts dark bluish gray. Belly, vent and under tail-coverts scarlet. Eyes brown; bill black; legs and feet pale lead color; claws brownish; soles of feet ochreous. Total length, 6½ in.; wing, 3⅝ in.; tail, 1¾ in.; bill (to gape), 1 in.; tarsus, 1⅝ in.

This species differs from *P. rubrinucha* Wallace, in its slightly smaller size, its silvery blue-gray ear-coverts, in the absence of the black line separating the silvery blue-gray of the breast from the scarlet belly, in the absence of a white shoulder spot, and in the different marking of the white speculum spot on the primaries.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

UNRECORDED SPECIMENS OF TWO RARE HAWAIIAN BIRDS.

BY OUTRAM BANGS.

Lately while arranging the skins of *Acrulocercus nobilis* in the Museum of Comparative Zoology I discovered among them a fine example of the long ago extinct *Acrulocercus apicalis* (Gould) of Oahu Island.

This specimen came to the museum in exchange from Brown University and had formerly belonged to John Cassin. It bears a label in Cassin's hand with the inscription, "Sandwich Isld. J. K. Townsend male," and was without doubt collected by Townsend during his visit to Oahu in 1835. The skin, No. 17,598, Museum of Comparative Zoology, is that of a fine adult male and although made seventy-five years ago is in perfect preservation, except that its feet and legs have, at some time, been somewhat eaten by insects.

Wilson and Evans in their Aves Hawaiiensis, 1890–1899 (p. "103"—the work is not paged) mention five specimens, all that were known to them, of *A. apicalis*—three in the British Museum, one of which went by exchange to Rothschild's Tring Museum, and a pair collected by Deppe which are in Vienna.

Rothschild, Extinct Birds 1907, p. 27, enumerates the same five specimens, but says that Deppe's skins are in Berlin.

Ours makes the sixth known example of *A. apicalis*, which is believed to have been confined to Oahu and which has not been seen alive by a naturalist since 1837.

It is the only one in America, Dr. Chas. W. Richmond informing me that the United States National Museum does not possess any, and Mr. Witmer Stone says that there is none in

the Academy of Natural Sciences in Philadelphia, although that institution had most of Cassin's Collection of birds.

In the Museum of Comparative Zoology there is also a fine pair of *Ciridops anna* (Dole), one of the very rarest of Hawaiian birds and certainly one of the most beautiful.

The exact origin of these skins, of excellent make and in perfect preservation, I have been unable to learn. They came to the museum with a few other Hawaiian birds—six skins of *Acrulocercus nobilis* and several petrels and terns—and were catalogued by Dr. J. A. Allen in 1870; names for none but the Moheo being written on the labels or in the register by that naturalist.

Ciridops anna was described by Judge Dole in 1879 and is supposed to be, or perhaps better to have been, confined to the island of Hawaii. It was, until I unearthed our two skins, known by three male specimens only, one now in the Bishop Museum and two in Rothschild's Museum at Tring. The female and young male were unknown.

Our male, No. 10,995, is in full plumage and very closely matches the exquisite plate in Wilson and Evans, Aves Hawaiiensis.

Our other specimen, No. 10,987, I take to be an adult female. Though a little smaller, it is exactly similar in proportions to the male, but is wholly different in color. It may be described as follows—

Forehead clothed in stiffened, pointed, semi-erect feathers as in the adult male. Top of head, nape, and sides of head cinnamon washed with dull olive-yellow on forehead and with the lores and a narrow frontal band more dusky; cheeks with paler shaft-stripes to the feathers; lower back grayish cinnamon, gradually passing into the purer color of the head; rump and upper tail coverts olive-yellow; tail dusky, fringed with olive-yellow; primaries blackish, narrowly edged with dark olive-yellow; secondaries more broadly edged with the same, the innermost nearly wholly dark olive-yellow; throat dull cinnamon, the feathers with paler shaft stripes, slightly washed with yellow-olive in lower middle; chest and breast dingy-smoke-gray, somewhat washed with olive, gradually passing into dark olive-yellow on belly; under wing coverts, axillars, under tail coverts and a small patch in lower middle belly

dilute rufous-cinnamon. The general pattern thus resembles that of the adult male, though the colors themselves are very different. Our two skins afford the following measurements (in mm.):

No.	*Sex.*	*Wing.*	*Tail.*	*Tarsus.*	*Culmen.*
10995	(♂ ad.)	80	44	22	11
10987	(♀ ad.)	73.5	41	21	10

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

NEW OR RARE BIRDS FROM WESTERN COLOMBIA.

BY OUTRAM BANGS.

The birds mentioned below were contained in a second collection* from western Colombia made by Mervyn G. Palmer, which I received from Mr. W. F. H. Rosenberg last summer but only just now have had time to touch. The region Mr. Palmer has been working in is a very rich one, and both collections sent me by Mr. Rosenberg have fairly astonished me in the numbers of rare and new forms they contained.

Following are short descriptions of the new forms in the present collection, and mention of a few other species where ranges are extended or the record is apparently worth publishing.

Botaurus pinnatus (Wagler).

Two specimens, ♂ and ♀, taken at Guabinas, Rio Cauca, January 10, 1908. This bittern seems to be very rare in South America north of Guiana, though it has been taken in Nicaragua.

Odontophorus baliolus sp. nov.

Type from Naranjito, Rio Dagua, western Colombia. Adult ♀, No. 23,432, Bangs collection, Museum of Comparative Zoology. Collected June 20, 1908, by M. G. Palmer.

Characters.—Somewhat similar to *O. parambæ* Rothschild of western Ecuador, but very much darker; upper parts nearly solid blackish-brown, only very slightly peppered and marked with paler (very different from the mottled upper parts of *O. parambæ*); under parts deep chestnut, much darker than in *O. parambæ;* black of chin and upper throat bordered above by a white stripe (not present in *O. parambæ*).

Measurements.—Type, adult ♀, wing, 132; tail, 48; tarsus, 36; culmen, 18.

* In July, 1908, in these Proceedings, I published a short paper on the first lot sent me from this source by Mr. Rosenberg.

Syrnium nigrolineatum nigrolineatum Sclater.

One adult ♀, La Maria, Dagua Valley, May 26, 1908. This skin is an exact match for several Chiriqui specimens, and the form thus ranges into western Colombia, while in the Bogota region *Syrnium nigrolineatum spilonotum* Sharpe takes its place.

Picumnus canus sp. nov.

Type from Naranjito, Rio Dagua, western Colombia. Adult ♀, No. 23,434, Bangs collection, Museum of Comparative Zoology. Collected June 20, 1908, by M. G. Palmer.

Characters.—Similar to *P. oliraceus* Lafr. in pattern, but slightly larger and of a very different color, being whitish and gray instead of olive and greenish.

Top of head black with small white spots; rest of upper parts dull smoke gray, wings somewhat edged with yellowish-white; belly dull white, faintly striped with dusky; chest dull grayish, passing into whitish-gray on throat; sides slightly tinged with pale yellowish.

Measurements.—Type, adult ♀, wing, 56; tail, 29.5; tarsus, 12.5; culmen, 12.

Threnetes fraseri (Gould).

A fine adult, sex not determined, of this Ecuadorian species was taken at Naranjito, Rio Dagua, June 22, 1908.

Xiphorhynchus rosenbergi* sp. nov.

Type from Guabinas, Rio Cauca, western Colombia. Adult ♂, No. 23,436, Bangs collection, Museum of Comparative Zoology. Collected January 9, 1908, by M. G. Palmer.

Characters.—Nearest to *X. chunchotambo* (Tschudi), of which it may be a subspecies, but with a *much heavier* bill; under parts paler; throat more buffy, and striping of chest heavier. From *X. nana* (Lawr.), which it somewhat resembles in general coloration, the new form can at once be told by having the middle of back distinctly marked with pale shaft lines bordered by black, by the striping of the chest being wider, the stripes more distinctly bordered by black, and by the belly being less indistinctly striped.

Measurements.—Type, adult ♂, wing, 108; tail, 97.5; tarsus, 23; culmen, 36.

Rhopoctites alogus sp. nov.

Type from near Pavas, west slope of Colombia, at 4,400 feet altitude. Adult ♂, No. 23,438, Bangs collection, Museum of Comparative Zoology. Collected February 8, 1908, by M. G. Palmer.

Characters.—Somewhat similar to *R. rufibrunneus* (Lawr.) of Costa Rica and Panama, but larger; bill both longer and stouter; colors above

* Named for Mr. W. F. H. Rosenberg of London, who has taken much interest in securing collections from this region.

duller, more olivaceous, less reddish brown; throat and sides of neck ochraceous instead of orange-rufous; body below from the chest backward uniform tawny ochraceous, wholly unstreaked, darker and browner on flanks and under tail coverts; pileum and cervix with narrow, pale shaft streaks to all the feathers—very different from the solidly brown pileum of *R. rufibrunneus*.

Measurements.—Type, adult ♂, wing, 97.5; tail, 91; tarsus, 27; culmen, 25.5.

But one specimen, the type, of this very distinct species was contained in the collection sent me. It represents a species wholly unlike *Automolus ignobilis* Scl. & Salv. or any other species so far as I can find, except *R. rufibrunneus*, from which also it is strikingly different.

Myrmeciza berlepschi Ridg.

This species was represented by six specimens, adults of both sexes, from Palmar, Pavas, and La Maria, western Colombia, taken in February, March, and June, which I have compared with the type from Chimbo, Ecuador, and find to be identical with it.

Rhynchocyclus sulphurescens asemus subsp. nov.

Type from near Pavas, western Colombia, 4,400 feet altitude. Adult ♂, No. 23,439, Bangs collection, Museum of Comparative Zoology. Collected February 15, 1908, by M. G. Palmer.

Characters.—Almost exactly intermediate between *Rhynchocyclus cinereiceps* of Central America and *R. sulphurescens exortivus* of the Santa Marta region of Colombia; differing from the former in having the throat and chest less strongly gray, but with the cap and back identically the same; from the latter it differs in having the cap much darker and clearer gray—less mixed with olive green; the back darker olive green; and the throat and chest just a trifle grayer.

Measurements.—Type, adult ♂, wing, 70; tail, 59; tarsus, 18; culmen, 11.5.

Three skins of this form were sent in—the type, and two adult males from Jimenez, killed in May. The subspecies is one of those that has no one very good character to distinguish it, but that is exactly intermediate between two quite different birds, resembling above *R. cinereiceps* and below *R. exortivus*.

It proves conclusively to my mind that *R. cinereiceps* is nothing more than a northern subspecies of *R. sulphurescens*.

Mionectes olivaceus hederaceus subsp. nov.

Type from near Pavas, western Colombia, 4,400 feet altitude. Adult ♀, No. 23,442, Bangs collection, Museum of Comparative Zoology. Collected February 12, 1908, by M. G. Palmer.

Characters.—Like *M. olivaceus venezuelensis* Ridg. in having under parts heavily streaked, but much darker, more grayish olive below; duller and darker greenish olive above, with the pileum much darker and

grayer than back, and of the size of *M. oliraceus oliraceus*, not larger. From *M. olivaceus oliraceus* it differs in much heavier, coarser streaking below, and in general darker, grayer coloration, the pileum much grayer and the back much darker, more grayish olive-green.

Measurements.—Type, adult ♀, wing, 62; tail, 47; tarsus, 15.5; culmen, 12.5.

Another specimen, from Rio Bitaco, May 2, 1908, is precisely like the type, and the west Colombian subspecies seems a very well marked one. I also received a skin of *M. striaticollis poliocephalus* Tschudi, collected by Mr. Palmer at San Antonio, Rio Cali, November 21, 1907.

Pheugopedius spadix sp. nov.

Type from Naranjito, Rio Dagua, western Colombia. Adult ♂, No. 23,446, Bangs collection, Museum of Comparative Zoology. Collected June 20, 1908, by M. G. Palmer.

Characters.—A very distinct species, apparently most nearly related to *P. atrogularis* (Salvin) of Costa Rica, but at once distinguished from that species by having a banded tail.

Color.—Pileum clove brown; sides of head and throat (not extending at all onto chest or neck) black, the ear coverts, a narrow line of feathers above the eye and on sides of the front, with white shaft stripes; upper parts, including margins of wing feathers (the wings unbanded), under side of neck, chest, breast and sides, rich chestnut; flanks dull brown, about between Prout's brown and raw umber; middle of belly and under tail coverts dull raw umber, with indistinct dusky cross bars; tail regularly barred across with black and chestnut, the black bars a little the wider.

Measurements—Type, adult ♂, wing, 64; tail, 54; tarsus, 23; culmen, 16.5.

Pheugopedius mystacalis saltuensis subsp. nov.

Type from San Luis, Bitaco Valley, western Colombia. Adult ♂, No. 23,448, Bangs collection, Museum of Comparative Zoology. Collected June 5, 1908, by M. G. Palmer.

Characters.—Similar to *P. mystacalis mystacalis* (Sel.) of Pallatanga, Ecuador, but head and hind neck much purer gray; breast, chest and sides much grayer, less buffy, being mouse gray; black malar stripe wider and consequently white supramalar stripe narrower.

Measurements.—Type, adult ♂, wing, 68; tail, 61; tarsus, 26.5; culmen, 18.5.

An adult male topotype is exactly similar, and the two skins I compared very carefully with many Ecuador specimens.

Henicorhina leucosticta eucharis subsp. nov.

Type from near Pavas, western Colombia, 4,400 feet altitude. Adult ♂, No. 23,444, Bangs collection, Museum of Comparative Zoology. Collected February 18, 1908, by M. G. Palmer.

Characters.—Similar to *H. leucosticta leucosticta* (Cabanis) of Guiana, but colors of upper parts and flanks paler, duller, much less chestnut or reddish brown—in the adult ♂ of the new form the back and wings are dull russet, the rump and upper tail coverts clear, pale russet, the flanks and under tail coverts cinnamon-russet. The female is similar, but slightly duller in color and with the pileum not solidly black, but dark brown medianly.

Measurements.—Type, adult ♂, wing, 62; tail, 31.5; tarsus, 23.5; culmen, 16.5. Adult ♀, No. 23,445, from near Jimenez, western Colombia, April 16, 1907; wing, 58; tail, 30; tarsus, 22; culmen, 15.5.

Phœnicothraupis cristata Lawr.

Three adult specimens, two males and a female, were secured at Naranjito, Rio Dagua, in June and July, 1908.

This species still remains so rare in collections that I have thought it worth while to make this record.

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PROCEEDINGS

OF THE

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ON THE NAME AND SYNONOMY OF THE ANTILLEAN SHARP-SHINNED HAWK.

BY J. H. RILEY.

[By permission of the Secretary of the Smithsonian Institution.]

In 1827, Vigors described a small sharp-shinned hawk taken near Havana, Cuba, by MacLeay, as *Accipiter fringilloides*, under which name it has always appeared in print, but if Haitian and Cuban birds are the same, as they have been considered by those who have had an opportunity of handling specimens from the two islands, then *Accipiter striatus* of Vieillot has twenty years priority and must be adopted until the birds of the two islands are proved distinct.

I am not aware that any direct comparison has been made between birds of the two islands; in fact the rarity of specimens in collections would preclude this. Lawrence, in 1860, described the adult male, adult female, young male, and two young females from Cuban specimens and Cherrie has described the adult female, adult male, and young male from Haitian specimens. Judging from descriptions, the birds of the two islands are similar or identical. I would like to add, however, that in the only specimen of the adult male handled by me the feathers of the nape have concealed white bases and the inner webs of the flight feathers externally, except the tertials, have dark cross bars, a feature not mentioned by either Lawrence or Cherrie. The following synonomy has been worked out by me and may prove useful to future investigators:

Accipiter striatus Vieillot, Ois. Am. Sept. I, 1807, 42, pl. 14 (Santo Domingo).—Strickland, Orn. Syn., 1855, 109 (part).

Falco Viellotinus Shaw, Gen. Zool. VII, part 1, 1809, 204 (Santo Domingo).

Sparvius striatus Vieillot, Nouv. Dict. d'Hist. Nat. X, 1817, 325.

S[*parvius*] *striatus* Vieillot, Tab. Enc. Meth., III, 1823, 1265.

Accipiter fringilloides Vigors, Zool. Journ. III, 1827, 434 (near Havana, Cuba).—Denny, P. Z. S. Lond., 1847, 38.—Lawrence, Ann. New York Lyc. Nat. Hist., VII, 1860, 255 (Cuba; desc. plumages).—Gundlach, J. f. O., 1871, 368 (Cuba); Contr. Orn. Cubana, 1876, 44; Orn. Cubana, 1895, 25 (habits, plumages).—Sharpe, Cat. Bds. Brit. Mus., I, 1874, 135 (foot-note).—Cory, Bds. Haiti and St. Domingo, 1885, 120 (desc. and plate ♀ juv.); Auk, IV, 1887, 41 (desc.; syn.; crit.); Bds. W. I., 1889, 199; Cat. Bds. W. I., 1892, 98.

Nisus fringilloides D'Orbigny, La Sagra's Hist. Fis. Pol. Nat. Cuba, Aves, 1839, 31; French ed., p. 18.—Ridgway, Bull. U. S. Geol. and Geog. Surv. Terr. II, 1876, 117 (desc. plumages and syn.).

A[*stur*] *fringilloides* Lembeye, Aves de Cuba, 1850, 128.

A[*stur*] *fuscus* Lembeye, Aves de Cuba, 1850, 128.

Nisus fuscus Cabanis, J. f. O., II, Suppl. 1855, p. lxxxiii (Cuba).—Cory, Bull. Nuttall Orn. Club, VI, 1881, 154 (Haiti).

Accipiter fuscus Brewer, Proc. Boston Soc. Nat. Hist., VII, 1860, 306 (Cuba).

[*Accipiter*] *fringilloides* Brewer, Proc. Boston Soc. Nat. Hist., VII, 1860, 306 (Cuba).—Gundlach, J. f. O., 1861, 322 (Cuba); J. f. O., 1862, 188; Repertorio fis.-nat. Cuba, I, 1865–66, 224.—Gray, Handl. Bds. I, 1869, 32 (Cuba).—Sclater and Salvin, Nom. Avium Neotr. 1873, 120 (Cuba).—Cory, List Bds. W. I. 1885, 22.—Gurney, List Diurnal Bds. Prey, 1884, 42.—Sharpe, Handl. Bds., I, 1889, 252.

Acc.[*ipiter*] *fringilloides* Gundlach, Anales Hist. Nat. Madrid, II, 1873, 100 (Cuba).

N.[*isus*] *fuscus* var. *fringilloides* Baird, Brewer and Ridgway, Hist. N. Am. Bds., III, 1874, 223.

N.[*isus*] *fringilloides* Ridgway, Bull. U. S. Geol. and Geog. Surv. Terr. II, 1876, 95 (Cuba).

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

TWO NEW POCKET GOPHERS OF THE GENUS *THOMOMYS*.

BY VERNON BAILEY.

A critical study of the genus *Thomomys* shows two well marked forms hitherto unnamed. One of these, from the yellow pine plateaus of northern New Mexico, is large and dark; the other, from the bottoms of hot desert basins of western Nevada, is large and pale. Both belong to the *aureus* group but mark its opposite extremes.

Thomomys apache sp. nov.

Type from Lake La Jara (7,500 feet altitude), on the Jicarilla Apache Indian Reservation, New Mexico. Number 135,366, ♂ adult, U. S. National Museum, Biological Survey Collection. Collected September 19, 1904, by James H. Gaut. Original number 3289.

General characters.—Size large, hind foot 33–34; colors dark; hind feet and tip of tail conspicuously white.

Color.—Upper and lower parts nearly uniform dull, sooty gray, slightly washed with dull buffy ochraceous; back with an ill-defined stripe of blackish; basal half to three-quarters of tail brownish or blackish, the rest abruptly white; hind feet white; lips usually and chin rarely white.

Skull.—Heavy, angular and ridged, similar in form and general characters to that of *aureus;* bullæ full and rounded; pterygoids U-shaped; nasals normally with slightly emarginate, doubly rounded posterior tips; upper incisors white tipped and decurved at right angles to axis of skull.

Measurements.—Type, total length, 250; tail vertebræ, 85; hind foot, 34. Adult female topotype, 229; 74; 33. *Skull* of type, basal length, 41; nasals, 14; zygomatic breadth, 28; mastoid breadth, 23; alveolar length of upper molar series, 8.5.

Thomomys canus sp. nov.

Type from Deep Hole, at north end of Smoke Creek Desert, Nevada. No. 78,365, ♂ adult, U. S. National Museum, Biological Survey Collec-

tion. Collected May 14, 1896, by Clark P. Streator. Original number 5169.

General characters.—Size of *aureus* or a little larger, hind foot 30–33; colors ashy or pale buffy gray; lower parts white.

Color.—Upper parts pale buffy gray, with dusky ear-patch and brownish nose; lower parts, feet and tail whitish.

Skull.—Like that of *aureus*, but palate flat instead of arched between the molar series; interparietal larger and more quadrate; bullæ slightly larger; anterior points of frontals less acute.

Measurements.—Type, total length, 242; tail vertebræ, 64; hind foot, 33. Adult female from type locality, 215; 64; 30. *Skull* of type, basal length, 41; nasals, 15; zygomatic breadth, 28; mastoid breadth, 23; alveolar length of upper molar series, 9.

Remarks.—In color *canus* closely resembles the gray phase of its near neighbor, *nevadensis*, but in cranial characters it shows close relationship with *aureus*.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

FLETCHER LAKE, INDIANA, AND ITS FLORA AND FAUNA.*

BY BARTON W. EVERMANN AND H. WALTON CLARK.

U. S. Bureau of Fisheries.

Fletcher Lake is situated in the southwest corner of Fulton County, Indiana, about 12 miles nearly due north from Logansport, and only a few rods north of the Cass County line. It is about 3 miles northeast of Lucerne on the Terre Haute and Logansport Railway. Its position is about 40° 55′ 30″ north latitude and 86° 18′ 16″ west longitude. It is among the southernmost glacial lakes of Indiana.

The writers visited Fletcher Lake, October 6, 1900, in the interest of the U. S. Bureau of Fisheries, for the purpose of making a physical and biological survey of it. Many soundings were taken and the depths of the lake in many places accurately determined. Many temperature observations were made and recorded, the character of the bottom and shores studied, and collections made of the animal and plant life of the lake. In these investigations valuable assistance was rendered by Messrs. John J. Hildebrandt and A. P. Jenks of Logansport.

Fletcher Lake is an elongate body of water with paralled sides and no bays, capes or marked irregularities of shore line. Its length is about $\frac{2}{3}$ of a mile and its width $\frac{1}{3}$, the area being about 30 acres. It appears to occupy a sort of closed-up, narrow valley. The long axis lies nearly due east and west. The abruptness of the descent all around the lake is worthy of note, as in this respect it differs markedly from Lake Maxinkuckee, and closely resembles such lakes as Holem, Cook and Meyers† of the Twin Lakes group in Marshall County, Indiana.

* Published by permission of the U. S. Commissioner of Fish and Fisheries.

† On recent maps called Southwest Lake, Northwest Lake and East Lake.

The water near shore and usually out for a distance of 50 feet or less is shallow. At the edge of this narrow shelf the depth suddenly increases to 15 to 25 feet. The soil about the lake appears in general to contain considerably more clay than that about Lake Maxinkuckee. The shores are nearly everywhere high and dry. The south shore is high for its entire length, and a few yards back is the terrace of a former shore-line. A similar but less distinct terrace is seen on the north side. On the north shore is some little marsh ground, and the ground at both ends of the lake is rather mucky and quaky. The lake is said to have once reached a considerably greater distance toward the enclosing hills, but was artificially drained to a lower level. It has, however, little or none of the lake-plain aspect characteristic of lowered lakes such as Eagle Lake, which is a good type of lowered lakes, or the marshes about the inlet and outlet of Lake Maxinkuckee.

The catchment basin of the lake is quite small. At its head is a little draw or ravine which, in wet weather, brings down water about 2 miles. There are a few ditches also running into the lake. The outlet is periodic, dry at the time the lake was visited, but during wet weather connecting with a small creek at its west end. The outlet is called Bluegrass Creek. This flows into Indian Creek which takes a course nearly due west to the Tippecanoe, of which it is a tributary.

Although, as has been said, Fletcher Lake quite closely resembles some of the Twin Lakes in general outline, it differs from them, Holem Lake in particular, in having firm shores. There is no fine sand beach such as is characteristic of Lake Maxinkuckee.

Just as the soil and shore differ somewhat from Lake Maxinkuckee, so does the land vegetation. No collections were made in the short time spent there, but the following notes were taken:

Among the sedges, the low sedge (*Cyperus diandrus*) and the straw-colored sedge (*C. strigosus*), common beach plants at Lake Maxinkuckee, are here present also, as is also the little composite, *Eclipta alba*. The cocklebur and barnyard grass, both of which form a pretty continuous fringe about Lake Maxinkuckee, are here uncommon or wanting; but, as lake shore vegetation varies considerably from year to year this is not necessarily a constant difference. The rough sedge (*Cyperus*

inflexus), which is very rare at Lake Maxinkuckee, and not very near the lake, was rather common on the shore at Fletcher Lake, and *Hemicarpha micrantha*, a delicate little bulrush-like sedge, which was not found at Lake Maxinkuckee, was found to be rather common. The naturalized bittersweet nightshade, *Solanum dulcamara*, which is not present near Lake Maxinkuckee, but which grows in abundance in a tamarack swamp several miles west of that lake, was common near the shore of Fletcher Lake and conspicuous by reason of its scarlet berries. The leafy bulrush, *Scirpus polyphyllus*, a plant of rather erratic distribution, not found at all at Eagle Lake or Lake Maxinkuckee, but seen in scattered clumps at others, was found here. The soapwort gentian (*Gentiana saponaria*) grows in considerable abundance near the lake. Other plants which enter into a general picture of the region, are the clumps of low willows, tangles of drop-seed grass (*Muhlenberghia*), and arrow-leaved tear thumb (*Polygonum sagittatum*), Carolina rose (*Rosa carolina*), tall blue verbena (*Verbena hastata*), patches of peppermint (*Mentha piperita*), stretches of sticktight (*Bidens connata*) now brown and bristling, clumps of Cornus (*Cornus sericea*), bunches of iron weed (*Vernonia fasciculata*) and fragrant goldenrod (*Euthamia graminifolia*). Along the marshy portions and at places near shore were blue flags and *Eleocharis*, and tangles of swamp loosestrife (*Decodon verticellata*) and patches of cattails (*Typha latifolia*).

The aquatics with emersed leaves, the spatterdock or yellow pond lily (*Nymphæa advena*), the grass-leaved arrowhead (*Sagittaria graminea*) most of the leaves of which were submersed, the creeping spike-rush (*Eleocharis palustris*), the shining pondweed (*Potamogeton lucens*), the white water lily (*Castalia odorata*), the bulrushes (*Scirpus lacustris* and *S. americanus*) and the pickerel-weed (*Pontederia cordata*) are confined to a narrow belt on account of the set-off in the bottom near shore. The aquatics with submerged leaves, among which were the whorled-leaved milfoil (*Myriophyllum verticillatum*), hornwort (*Ceratophyllum demersum*), the ditch moss (*Philotria canadensis*), *Naias*, water marigold (*Bidens beckii*), fennel-leaved pondweed (*Potamogeton pectinatus*) and the eel-grass pondweed (*Potamogeton zosteræfolius*), were exceedingly abundant; so much so that masses of them, especially Philotria, collected in great rolls

before the net and interfered seriously with seining operations. Various algæ, among which were *Chara*, *Spirogyra* and *Mesocarpus*, were quite abundant; on the Chara grew considerable attached *Rivularia*.

The water of Fletcher Lake was at the time of our visit a clear lively green like that of Lake Maxinkuckee, and without the yellowish cast characteristic of Eagle Lake. No plankton was collected.

A number of soundings and bottom temperatures were recorded. The only vessels of any kind on the lake were about a dozen flat-bottomed boats, excellent for cruising about near shore, but very difficult to row straight and hard to keep in place, especially during a wind, such as prevailed at the time. However, it is believed that the soundings taken are sufficient to determine the maximum depth and general topography of the lake bottom.

Several lines of soundings were run and temperatures taken as follows:

1. A line on the long axis and in the center of the lake from east to west. Depths in feet—22.5, 35, 31.5, 33.5, 34, 16.5. Bottom temperatures in fahrenheit degrees: 51°, 47.1°, 47.9°, 48.5°, 47°, 64.4°. Temperature of air, 77°.
2. A line on the long axis, from east to west, taking a sounding at every 10 oar-strokes. Each stroke carried the boat about 5 feet, thus putting the soundings at intervals of about 50 feet. Depths in feet—5, 22, 34, 34, 34, 32, 32, 34, 32, 32, 34, 40, 41, 40, 33, 28, 28, 30, 28, 26, 32, 38, 40, 40, 37, 30, 28, 15, 5.
3. A line from south to north about 200 feet east of the west end. Depths in feet—15, 19, 24, 34, 38, 38, 33, 30, 21, 16, 6.
4. A line from north to south beginning about 200 feet east of north end of line 3, and ending about 300 feet east of south end of line 3. Depths—5, 14, 19, 24, 28, 28, 28, 28, 29, 29, 28, 30, 31, 35, 34, 31, 21, 14.
5. A line from the camp site on south shore to a point on shore 400 feet east of the brick house. Depths—8, 19, 21, 27, 30, 32, 30, 26, 20, 20, 17, 12, 2.

6. A line from north to south parallel to line 5, but about 300 feet east of it. Depths—8, 17, 19, 22, 26, 28, 28, 29, 28, 28, 25, 20, 16, 6.
7. A line north from the boat-landing near Hall's house. Depths—2, 12, 18, 24, 36, 40+, 40+, 34, 32, 12, 3.
8. A line from the ice-house on north side near the church southwest to Hall's boat-landing. Depths—7, 16, 19, 20, 20, 22, 26, 26, 24, 24, 26, 28, 27, 30, 32, 38, 39, 41, 42, 41, 41, 40, 38.

The lake seems to occupy a long, narrow trough, with abrupt sides all around and with pretty uniform depth. There are 2 deep holes,—one just off Hall's landing and another about the same distance from the west end of the lake. The depth in each of these scarcely exceeds 40 feet,—the greatest found in the eastern being 42 feet, and 40 feet in the western.

The abruptness of the descent all around the lake is worthy of note, as this lake in this regard differs markedly from Lake Maxinkuckee.

The water of Fletcher Lake is unusually cold. The bottom temperature is about 2 degrees lower than that of Lake Maxinkuckee, although the depth is less than half as great. This greater coldness has its effect on the animal and plant life of the lake. The game and food-fishes are sufficiently numerous as to species and individuals to make it of considerable interest to local anglers. Of the 22 species of fishes known from it, at least 14 are food-fishes of some value and at least 8 possess some game qualities. The most important are the straw bass, calico bass and the yellow perch. Each of these is sufficiently abundant to attract many anglers to this beautiful little lake.

Fauna of Fletcher Lake.

Not much attention was paid to any of the animals of the lake except the fishes. A large number of dead shells of *Planorbis campanulata* were seen on shore, and mussels were said to be pretty abundant (*Anodonta grandis*), specimens of which were later sent us by Mr. Joseph Clark Taylor of Logansport. A number of whirligig beetles were noticed on the surface of the water, and several cricket frogs were caught.

The following is a list of the fishes known from this lake;

1. **Amia calva** Linnæus.
DOGFISH.

Probably not rare.

2. **Ameiurus natalis** (Le Sueur).
YELLOW CAT.

Not uncommon.

3. **Ameiurus nebulosus** (Le Sueur).
COMMON BULLHEAD.

Common.

4. **Catostomus commersonii** (Lacépède).
COMMON SUCKER.

Not rare.

5. **Moxostoma aureolum** (Le Sueur).
COMMON REDHORSE.

Probably not common.

It is said that the suckers and redhorse run out to the prairie through the outlet during high water in the spring.

6. **Campostoma anomalum** (Rafinesque).
STONEROLLER.

Our collection contains one specimen, 3.5 inches long.

7. **Pimephales notatus** (Rafinesque).
BLUNT-NOSED MINNOW.

Common. We have in our collection 7 specimens ranging in length from 3 to 3.5 inches.

8. **Abramis crysoleucas** (Mitchill).
GOLDEN SHINER; ROACH.

Abundant. We have 21 specimens, from 3 to 4 inches long. The peritoneum is blackish. There are a few encysted trematodes in the skin (*Diplostomum*), 5 fishes being affected; 4 with 1 and 1 with 4 of these trematodes. The stomach of one specimen examined contained a considerable amount of *Spyrogyra* (well disintegrated), a species with short cells, and a few insect remains.

9. **Notropis whipplii** (Girard).
SILVERFIN.

There are 2 specimens in the collection, each about 3¼ inches long.

10. **Erycimba buccata** Cope.
CAVERN-JAWED MINNOW.

One specimen 3¼ inches long was procured.

11. **Lucius vermiculatus** (Le Sueur).
GRASS PIKE.

Rather common.

12. **Fundulus notatus** (Rafinesque).
TOP MINNOW.

Our collection contains 4 specimens from 1½ to 2 inches long. All are

immature, and have the rudimentary cross-bars still present making the lateral band very irregular in outline. The short bars are vertical on the anterior part of the fish but on the caudal peduncle they slant backward.

13. **Fundulus dispar** (Agassiz).
TOP MINNOW.

One specimen obtained.

14. **Pomoxis sparoides** Lacépède.
CALICO BASS.

There are two specimens in the collection 3 and 3½ inches long. These are rather slender and have the blotches on the sides arranged more or less regularly in bars or rings, in this respect quite closely resembling *P. annularis*. One, however, has 7 dorsal spines and the other 8. They are locally called crappie.

15. **Ambloplites rupestris** (Rafinesque).
ROCK BASS

Probably common.

16. **Chænobryttus gulosus** (Cuvier & Valenciennes).
WARMOUTH; MUD BASS.

One specimen 4½ inches long. It is probably common here.

17. **Lepomis pallidus** (Mitchill).
BLUEGILL.

Very common, but reaching a small size.

18. **Eupomotis heros** (Baird & Girard).

We have 4 specimens each about 5 inches long. It appears to be one of the most common fishes here. Mr. Hall called them "Goggle-eye."

19. **Micropterus salmoides** (Lacépède).
STRAW BASS.

Young examples 4 or 5 inches long were very common. Good-sized fishes of this species are often caught, though fishing is said to be poor this year. The small-mouth black bass does not occur in this lake.

20. **Perca flavescens** (Mitchill).
YELLOW PERCH.

Very abundant.

21. **Etheostoma hildebrandti** Evermann & Clark sp. nov.

Among the darters collected is one which was identified in the field as *Etheostoma iowæ*, but which, on closer examination, proves to belong to an undescribed species.

It may be described as follows:

Head 3.78 in length; depth 6.52; eye 3.96 in head; snout 5.95 in head or 1.5 in eye; mandible 2.97; interorbital 5.97 or equal to snout; preorbital 7.93; D. VIII–9; A II, 7; scales 5–63–8, 26 developed tubes and about 15 more rather faint pores.

Body slender and elongate, somewhat compressed, the caudle peduncle long and slender; head rather long when considered in its entirety but

short and blunt anteriorly, the snout short and rounded; jaws about equal; mouth small, nearly horizontal, the tip of maxillary reaching about to anterior edge of pupil; eye large, placed high.

Scales small, the first row on the back above rather smaller and irregularly placed; cheeks, opercles, and breast well scaled; belly with ordinary scales.

Spinous dorsal rather high, highest anteriorly, the longest spine 2 in head, the spines slender, the edge of the membrane forming straight chords joining the spines near their tips; the base of the fin 1.20 in head and covering about 14 rows of scales; dorsals well separated, the space between them 4.25 in head and covering about 3 rows of scales; soft dorsal rather high and rounded, its longest ray equal to the longest spine, 2 in head, the base of the fin 1.32 in head and covering about 15 rows of scales; anal fin rather large, its first spine 2.97 in head, the second spine considerably shorter; the base of the fin 2.38 in head, covering 7 rows of scales; pectoral long, acutely rounded, reaching to tip of ventral or halfway to vent; ventrals rather short, acutish, their length 1.25 in head; caudal rather acute, its length 1.48 in head.

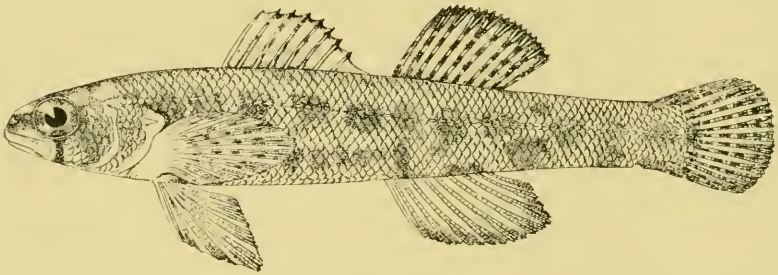

Fig. 1.
Ethcostoma hildebrandti Evermann & Clark. Type.

Ground color, straw-yellow; sides blotched all over with irregular brown blotches; a series of rather elongate blotches along middle of side; belly plain; dorsals, caudal and pectorals with blotches consisting of dots, lines and minute punctulations on the rays, these somewhat elongate on the caudal and roundish on the other fins; these dots arranged in rather zigzag bars; a dark streak downward from the eye.

This darter differs from *E. iowæ*, to which it appears to be most closely related, in the well scaled breast and the more slender form.

The type (about 2⅛ inches long) is No. 64,616, U. S. National Museum.

We take pleasure in naming this new species for our friend, Mr. John J. Hildebrandt of Logansport, Indiana, an enthusiastic angler and a good naturalist.

22. **Microperca punctulata** Putnam.

LEAST DARTER.

We have in our collection 1 specimen of this species about 1½ inches long.

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PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON

A NEW GENUS OF AMPHIBIA SALIENTIA FROM DUTCH NEW GUINEA.

BY THOMAS BARBOUR.

Not long ago I procured a small series of Papuan reptiles taken by Mr. Pratt at Fak Fak, New Guinea. One of the two water snakes (*Natrix mairii*) showed a large swelling along its midregion and a single cut revealed the subject of this notice.

Pomatops gen. nov. *Engystomatidarum.*

Pupil large, round. Tongue large, much longer than broad, entire, free on sides and behind to a considerable extent. Palate with two feebly developed papillose ridges, curving forward, deep in the entrance of the oesophagus. Tympanum hidden. Fingers and toes quite free, their tips very slightly dilated. No precoracoids; no omosternum; sternum small and cartilaginous. Diapophyses of sacrum scarcely dilated at all. Terminal phalanges T shaped. The most interesting feature of this new form is the development of the eyelids. The upper eyelids are involved in a flap of skin extending for some distance anterior and posterior to the position of the eye. These flaps are sufficiently developed so that they may be laid down and thus completely cover the whole eye. Two semilunar shaped white spots one below the position of each eye give the creature the appearance of being open-eyed even when the folds of skin along the sides of the head are down and the eyes are thus quite hidden.

Pomatops valvifera sp. nov.

Type: A single example, well preserved. Coll. Mus. Comp. Zool. 2577.

Taken from the stomach of a specimen of *Natrix mairii* (Gray) from Fak Fak, Northwestern Dutch New Guinea. The snake was caught there by Mr. A. E. Pratt, the well known zoological collector.

Habit rather slender. Head short, snout not prominent, mouth rather small, eyes directed laterally. Limbs moderate; first finger shorter than second; outer toe longer than inner; subarticular tubercles very indistinct; metatarsal tubercles wanting. The hind limb being carried

forward along the body, the tibio-tarsal articulation reaches the posterior border of the eye. Skin of both upper and lower surfaces smooth. *Color:* Upper surface of body and limbs slaty gray with lighter marblings; lower surface ochraceous buff, varying to both a lighter and darker shade.

This curious and interesting find suffered a little by having been swallowed, in that it is difficult to reconstruct the exact condition of the sternum as well as the general habit in life. The fore limbs lay forward along the sides of the head and the hind limbs were stretched out behind so that the whole creature was pressed out longitudinally. The skin is only broken on the upper surface of one thigh, where it was evidently ripped by a tooth. The snake from which it was taken is a water loving form. There seems no reason to suppose that *Pomaptops* is a water frog. Burrowing habits are suggested by the protections to the eyes. This makes the tenth genus of Engystomatidae, so far as known confined to Papua.

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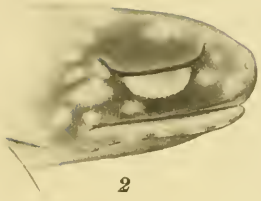

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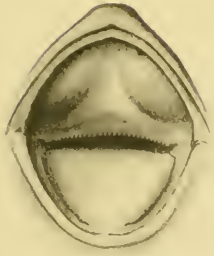

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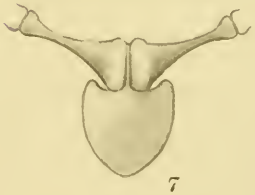

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E. N. FISCHER, DEL.

HELIOTYPE CO., BOSTON.

Pomatops valvifera Barbour.

Fig. 1. Side view of head with eye flap raised artificially. x 3.
Fig. 2. Same but with eye flap naturally depressed. x 3.
Fig. 3. Lower surface of right manus. x 3.
Fig. 4. Lower surface of right pes. x 3.
Fig. 5. Dorsal view of type. x 1¼.
Fig. 6. Interior of buccal cavity. x 3.
Fig. 7. Sternum. x 4.

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PROCEEDINGS

OF THE

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ON THE NATURE OF THE TEETH IN CTENOID SCALES.

BY T. D. A. COCKERELL AND EVELYN V. MOORE.

In the course of our examination of a number of ctenoid scales, we have come to the conclusion that the teeth arise through the modification of the apical ends of vertical circuli, i. e., circuli which in the apical region retain their primitive vertical position. It is not evident that they have anything to do with the radii. In very highly specialized ctenoid scales, such as those of *Distichodus* among the Characinidæ, or *Rhinogobius* among the Gobiidæ (these two genera, though so little related, have the same kind of apical teeth), the teeth form a separate fringe which appears to have no intimate connection with the rest of the scale. From the study of such as these, the true nature of the ctenoid feature could not be made out, but it is

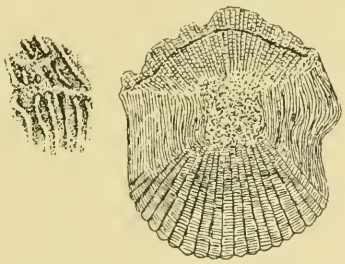

Fig. 1.
Scale of *Neomænis griseus*, showing at left, connection of lateral with apical circuli.

admirably shown in the Characinid, *Citharidium ansorgii*, in which the comparatively few and remote teeth are seen to be continuations of vertical apical circuli, supplemented by the con-

vergence and coalescence of those immediately adjacent. The few genuine radii in this scale are between the teeth, and in the figure one is seen crossing the circuli obliquely.

The Lutianid, *Neomænis griseus* (L.), and the Hæmulid, *Aniso-*

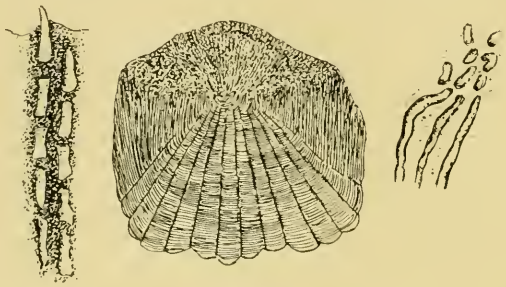

Fig. 2.
Scale of *Anisotremus virginicus*, showing connection of vertical circuli with teeth (left) and connection of lateral with apical circuli (right).

tremus virginicus (L.), (scales of both from Tampa, Florida, kindly sent by Dr. S. Graenicher) illustrate the same thing in a different way. The jointed lines radiating at the apex are not radii, but modified circuli. Their connection with the lateral circuli can be distinctly made out as is shown in our figures.

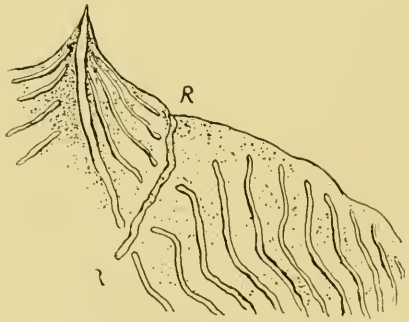

Fig. 3.
Portion of scale of *Citharidium ansorgii*, showing a lateral apical tooth, *R R*, on radius, other markings circuli.

It follows from the above theory that a scale with completely transverse apical circuli, such as that of *Argyrosomus*, can not be and can not become ctenoid. The reason why there are no ctenoid Cyprinid scales seems to be, that the group has advanced

too far along the line of modification in regard to the circuli to be able to produce them. The more primitive Characinidæ, however, have been able to develop marginal teeth more than once, independently.

According to our view, a scale can not have marginal teeth, and *transverse* circuli running below them. Thus *Sebastodes* and *Pomotis* have scales with similar basal radii, and in many respects alike, but *Sebastodes* has vertical apical circuli, and is ctenoid, while *Pomotis* has them transverse and is absolutely cycloid.

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ON THE TYPE SPECIMEN OF THE CRINOID DESCRIBED BY MÜLLER AS *ALECTO PURPUREA*.

BY AUSTIN HOBART CLARK.

In the year 1843 Professor Johannes Müller described, under the name of *Alecto purpurea*, a supposedly new comatulid which had been brought from Australia by Preiss. No further mention of this form is found until 1884 when Professor F. Jeffrey Bell, in reporting upon the collections made in northeastern Australia by the *Alert*, tentatively identified some of his specimens with it. Dr. P. H. Carpenter, in the preparation of the *Challenger* report upon the comatulids, visited Berlin, and was able personally to examine Müller's original specimen. From an examination of the notes which he made from it, he decided that it represented the species which was originally diagnosed by Linnæus in 1758, on the basis of an example from the Indian Ocean still preserved at Lund, as *Asterias pectinata*. Carpenter's verdict has been everywhere accepted as final, and Müller's *Alecto purpurea* has been allowed to lapse into the synonomy of the Linnæan *Asterias pectinata*, the *Comatula pectinata* as now understood.

The authorities of the Berlin Museum have recently been so kind as to submit to me for study, in connection with the material in the U. S. National Museum, their entire collection of recent crinoids, and they had the generosity to include such of the old Müllerian types as are in their possession. It is needless to remark that this act of courtesy on their part has placed me under the greatest obligation to them. All who have studied the recent crinoids know that many of Müller's descriptions, written nearly 70 years ago, are very difficult to

appreciate, and in some cases his original diagnoses have never been revised, so that the identification of certain of his forms is now more or less a matter of guesswork. Carpenter placed some of Müller's species in the synonomy of earlier species described either by him or by Lamarck, without any notes in regard to the type specimens. While in most cases this course was no doubt justified, increasing knowledge in regard to the differential specific characters of comatulids has raised certain questions as to the propriety of his action in so doing in one or two instances, and it has thus become imperative that Müller's types be reexamined, and described and figured along the lines followed in the systematic work of the present day. Through the kindness of the Berlin Museum I have been placed in so fortunate a position as to be able to do this with the types in their possession, and I take this opportunity of acknowledging my deep indebtedness therefor to that institution, and in particular to Drs. W. Weltner and R. Hartmeyer.

Professor Müller's systematic work on the comatulids, considering his limited amount of material, was exceptionally good. Most of his descriptions even at the present day leave little to be desired, being far more detailed and accurate than very many of those subsequently drawn up by others. But he very rarely gave any comparative notes; each of his descriptions he regarded as a unit which needed no comparison with any other similar unit. This has resulted in one or two instances in the suppression of a species which, had a comparison with other allied species been given, would have been recognized as valid.

Alecto purpurea belongs to the Comasteridæ, falling in the subfamily Comactiniinæ and in the genus *Comatula* as now understood. It is a rather small species, and is most nearly related to *C. pectinata* from which, however, it is quite distinct, being separable at once by the curious segregation of its cirri, which are from five to ten in number and occur singly or in pairs in the interradial angles of the centrodorsal, those of *C. pectinata* occurring in an irregular row all around the margin. I have examined a large number of specimens of *C. purpurea*, all from Queensland, and compared them with some dozens of *C. pectinata* from all parts of its range, and have never had any difficulty in differentiating them. The type specimen may be described as follows:

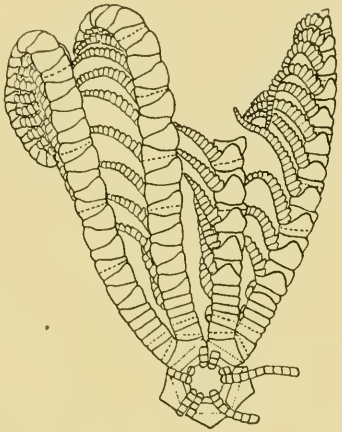
Alecto purpurea J. Müller.

Alecto purpurea J. Müller, Wiegmann's Archiv für Naturgesch., 1843, I, p. 132 (New Holland).

Centrodorsal a small thin disk, with the slightly concave dorsal pole about 1 mm. in diameter.

Cirri broken; ten cirrus stumps remain, the longest 5.5 mm. long with ten segments, the first short, the remainder about one-third broader than long. The cirri are segregated in the interradial angles of the centrodorsal.

Radials very short, just appearing beyond the centrodorsal; 1 Br_1 and 1 Br_2 very closely united, appearing externally as if united by syzygy, when taken together broadly pentagonal, twice as broad as long; 1 Br_1 laterally united; 1 Br_2 (axillary) triangular, the lateral angles not in apposition.



Alecto purpurea J. Miller; the type in the Berlin Museum.

Ten arms 70 mm. long; first two brachials united by what appears to be a perfect syzygy, forming a wedge shaped pair about twice as broad as long in the median line; the first brachial is short with its proximal and distal edges parallel, and the second is triangular, twice as broad as the exterior length; third and fourth brachials united by syzygy, forming a short nearly oblong pair about twice as broad as the maximum length; following three brachials short, slightly wedge shaped, nearly three times as broad as long, the following becoming triangular, twice as broad as long, with the anterior edge slightly concave and the exterior slightly convex. The brachials gradually increase in length distally, and in the outer part of the arm become wedge shaped, and distally about as long as broad. In the median line of the dorsal surface of the arm there runs a narrow low rounded carination which is rather prominent and is continued to the arm tip. The arms increase slightly in diameter to the twelfth or

fourteenth brachials, then taper slowly distally. Syzygies occur between the third and fourth brachials, again between the eleventh and twelfth to thirteenth and fourteenth (usually in the latter position) and sixteenth and seventeenth or seventeenth and eighteenth (usually in the latter position) and distally at intervals of from three to five (usually four) oblique muscular articulations.

The pinnules resemble those of *Comatula pectinata;* the second segment of the second and third is more or less enlarged and carinate dorsally, most marked on the former; the third segment is similarly, but much less noticeably, modified.

Color, deep purple.

Type locality.—New Holland. The type is in the Berlin Museum.

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GENERAL NOTES.

A NOTE REGARDING THE GREEN ANOLIS FROM THE NORTHERN BAHAMAS.

In December, 1904, I reported on a collection of reptiles from the Bahama islands (Bulletin Mus. Comp. Zool., Vol. 46, 1904, p. 55-61). I then surmised that the specimens called *Anolis porcatus* Gray were really different from that Cuban species. Last year while in Cuba I collected series from Santiago, Puerto Principe, and near Havana, which, added to the small material previously available, makes it possible to present a confirmation of the suspicion of distinctness between Bahaman and Cuban specimens.

In 1894 Cope (Proc. Ac. Nat. Sci., Phila., 1894, p. 432) described *A. principalis brunneus* as a new subspecies from Crooked Island. Now, even though no topotypes of this form are available for comparison, but judging from what we know regarding the distribution of Bahaman lizards, there seems no reason to believe that the specimen which Cope had was different from the examples before me from New Providence and Andros islands. The Bahaman specimens then should stand as a distinct species, which may be known as *A. brunneus* Cope. They may be distinguished from Cuban examples by a much smaller size; the absence of the prominent sky-blue markings on the head and neck of the male; and the more weakly developed longitudinal rugae of the rostrum. The snout of small specimens of *A. porcatus* is somewhat shorter than in the specimens of *A. brunneus* of a similar size; but otherwise they are almost identical. The adult Cuban male specimens can, of course, be distinguished at once in life by the brilliant blueness of their heads, a color which I have not observed them to change.

Stejneger in his paper on Batrachians and Land Reptiles of the Bahaman Islands (in "The Bahaman Islands," New York, 1905, the Macmillan Company, p. 332) says: "The Bahaman specimens are very close to the Cuban ones, though I have a strong suspicion that eventually they may be found to be separable. So much is certain, however, that the Bahaman form is in no way directly connected with *A. carolinensis*, but that its relationship is with Gray's *A. porcatus*."

It is interesting to note that the suspicion which was expressed by both Dr. Stejneger and myself regarding the distinctness of these two forms is confirmed; but while there seems no reason to doubt the derivation

of *A. brunneus* from *A. porcatus*, as Stejneger has suggested, it should be noticed that *A. brunneus* is much more similar to *A. carolinensis* than is *A. porcatus*.

—*Thomas Barbour.*

ELEUTHERODACTYLUS RICORDII IN FLORIDA.

The capture of a specimen of *Eleutherodactylus ricordii* (Dumeril et Bibron) at Ean Gallie about the center of the East Coast of Florida in January of this year was a great surprise as I am reasonably familiar with the fauna of this locality. Cope in his Check List of North American Batrachia and Reptilia (Bull. 1, U. S. Nat. Mus., 1875, p. 31) records it from Southern Florida, Cuba and Bahamas. Boulenger (Cat. Batr. Sal., 1882, p. 213) gives a similar distribution though he had seen no specimens. Later Cope writing again in his Batrachia of North America (Bull. 34, U. S. Nat. Mus., 1889, p. 318) says "A single specimen from Key West, Florida, is now in the National Museum. Its proper habitat is Cuba." This seems to be the single capture upon the strength of which Southern Florida has generally been included in the area of its occurrence.

The Eau Gallie example differs in no wise from Bahaman and Cuban individuals plenty of which are available here in the Museum of Comparative Zoology for comparison.

Stejneger has remarked on the identity of Cuban and Floridan examples (The Bahama Islands, New York, The Macmillan Co., 1905, p. 331). He informs me that there is no specimen in the National Museum from Key West, but one old one labeled "Southern Florida" and four others more recently received from Lemon City.

That this form has reached Florida fortuitously and in very recent times there can be no doubt whatever. The questions of the speed of its dispersal and whether it retains permanently its identity with West Indian examples are of very vital interest. This note is offered with the hope that collectors may be on the watch for this species and that they may record specimens that have or which may in future come to their notice.

—*Thomas Barbour.*

ON THE NAME OF THE TRINIDAD CŒREBA.

The yellow-breasted honey-creeper from Trinidad was named *C.* [*cœreba*] *trinitatis* by Lowe (Ibis, Oct., 1907, 566), but unfortunately Bonaparte (Comp. Rendus, 38, 1854, 258) gave the same name to the blue honey-creeper, now known as *Cyanerpes cœrulea trinitatis* (cf. Hellmayr. Nov. Zool. xiii, 1906, 8). As this leaves the yellow-breasted bird from Trinidad, if distinct from *C. luteola*, without a name it may be called *Cœreba luteola hellmayri*.

—*J. H. Riley.*

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A NEW *MICROSOREX* FROM THE VICINITY OF WASHINGTON, D. C.

BY EDWARD A. PREBLE.

On April 25, 1903, while searching for salamanders in company with W. H. Osgood and W. P. Hay on the Virginia shore of the Potomac above Plummer's Island, I dislodged from the decayed interior of a large fallen log a tiny shrew. The rarity of any species of long-tailed shrew in the vicinity of Washington caused me to take special pains in preserving the specimen. Later, when I examined it carefully, I was surprised to find that it belonged to the genus *Microsorex*, hitherto unknown to occur south of Ohio and New York. It was apparent that the specimen represented an undescribed form, but its characterization was deferred in the hope that other specimens would be detected. This did not occur until January 24 of the present year, when William Fink of Berwyn, Maryland, found a second specimen in the decayed heart of a dead chestnut tree, which he cut from a dry hillside at some distance from water. He presented it to the U. S. National Museum, and owing to the courtesy of the curator of mammals it has been loaned to me for study. Unfortunately the condition of the specimen at the time it reached the museum precluded its being made into a skin, and it was put into alcohol. Consequently it is not possible to describe the color of the winter pelage. It was carefully measured while in the flesh, however, and the skull was removed. Since it agrees closely in measurements and skull characters with the original specimen, there remains no doubt as to the advisability of describing the species, which may be known as

Microsorex winnemana sp. nov.

Type from Fairfax County (bank of Potomac River near Stubblefield Falls), Virginia. No. 126,320 U. S. National Museum, Biological Survey

Collection. ♀ young adult, skin and skull. Collected by Edward A. Preble, April 25, 1903.

General characters.—Similar to *Microsorex hoyi*, but considerably smaller; braincase proportionally higher and more rounded.

Color.—Upperparts grayish brown, slightly tinged about head and face with ochraceous; lowerparts ashy-gray, the line of demarcation being quite distinct; tail bicolor, the upper surface like the back, the lower silvery gray. The type is apparently in summer pelage, and the hair is much shorter than that of the Berwyn specimen, taken in winter.

Cranial and dental characters.—Compared with skulls of *Microsorex hoyi* from Elk River, Minnesota, assumed to be typical, the skull of *Microsorex winnemana* is decidedly smaller; the braincase more rounded and relatively higher; the rostrum proportionally shorter and lighter, and in consequence the teeth much crowded, the minute third unicuspid being detected with difficulty. The teeth do not differ essentially in shape from those of *Microsorex hoyi*.

Measurements.—Type measured in flesh: Total length, 78; tail vertebræ, 28; hind foot, 9 (in *M. hoyi* 10 to 10.5 mm.). The specimen from Berwyn, Maryland, measured: 86; 29; 9.5. Skull of type: Greatest length, 13.8; breadth of braincase, 6. Skulls of *M. hoyi* measured approximately 15.5 by 7 mm.

Remarks.—*Microsorex winnemana* is the smallest species of shrew (and therefore the smallest mammal) thus far discovered in America. The specific name *winnemana* (beautiful island) is in allusion to Plummer's Island, the home of the Washington Biologists' Field Club, near which the type specimen was taken.

While comparing the Berwyn specimen Gerrit S. Miller, Jr., and Ned Hollister brought to light a peculiar situation regarding the supposed type of *Microsorex hoyi*. Baird in his original description of *Sorex hoyi* (Rep. Exp. & Sur. R. R. Pac. VIII, p. 32, 1857) described and listed two specimens, both from Racine, Wisconsin, an alcoholic (No. 1688), with skull *in situ*, and a skin with its skull (No. $\frac{6\,3\,2}{1\,7\,8\,3}$). In his plate (Pl. XXVIII) he figures the alcoholic (No. 1688), and a skull without number) which would naturally be assumed to belong to the alcoholic. Lyon and Osgood (Bull. 62, U. S. Nat. Mus. p. 244, 1909), regard No. 1688 as the type. Miller and Hollister, however, inform me that No. 1688 is an undoubted *Sorex personatus*, as shown by the skull, which has never been removed but has been partially bared to expose the teeth. Since the skull figured by Baird does not belong to No. 1688, it is fair to presume that it represents his other specimen, No. 1783. It is plain that this skull, which is still in the U. S. National Museum, should be regarded as the type of *Sorex hoyi* Baird, and it is so considered by Miller and Hollister.

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A NEW SUBSPECIES OF PIGMY OWL.

BY E. W. NELSON.

The Pigmy owls of the Rocky Mountain region of the United States have been considered to be true *Glaucidium gnoma* which was described from "Mexico." Specimens in the collections of the Biological Survey and the U. S. National Museum show, however, that typical *G. gnoma* is limited to the mountains about the southern end of the Mexican Tableland (and probably southward) while the bird of the Sierra Madre of northern Mexico and of the Rocky Mountains in the United States is a recognizable subspecies, which is described below.

Glaucidium gnoma pinicola subsp. nov.

ROCKY MOUNTAIN PIGMY OWL.

Type from Alma, New Mexico; No. 206,021, ♀, U. S. National Museum (Biological Survey Collection); collected December 25, 1908, by Clay Hunter.

Distribution.—Rocky Mountain region of the United States and the Sierra Madre of northwestern Mexico.

Subspecific characters.—Much larger and grayer than true *G. gnoma*.

Remarks.—*Glaucidium gnoma* Wagler was described from a specimen in the Wurzburg Museum collected in "Mexico" by Dr. Petz. No definite type locality was given but Dr. Petz collected several other birds in southern Mexico and it is a fair inference that this owl came from the same region. This supposition is confirmed by the description of the type which proves it to be a representative of the small grayish brown owl which inhabits the mountains about the southern border of the Mexican Tableland.

Glaucidium gnoma pinicola is the largest and grayest of the subspecies.

Glaucidium gnoma californicum, intermediate in size between *gnoma* and *pinicola*, is the darkest and most reddish brown of the subspecies. It occupies coniferous forested areas in the Pacific Coast region of the United States and British Columbia.

True *gnoma* is more suffused with brownish than *pinicola* and approaches in coloration unusually pale specimens of *californicum*. In a series of 11 specimens of *pinicola* all but one agree closely in the general grayness of the upperparts. A single specimen from Fort Whipple, Arizona, however, is almost as brownish as typical *gnoma* but may be distinguished by its larger size.

The following measurements of typical specimens show the differences in size between the three subspecies:

G. gnoma gnoma, ♂ (type), "Mexico": Wing, 83; tail, 57; tarsus, 19.

G. gnoma californicum, ♂, Pescadero, Calif.: Wing, 93; tail, 67; tarsus, 20.

G. gnoma pinicola, ♂, Flagstaff, Ariz.: Wing, 96; tail, 69; tarsus, 20.

G. gnoma gnoma, ♀, Huitzilac, Morelos, Mex.: Wing, 91; tail, 59; tarsus, 19.

G. gnoma californicum, ♀, Rockport, Calif.: Wing, 97; tail, 66; tarsus, 21.

G. gnoma pinicola, ♀, (type) Alma, N. M.: Wing, 101; tail, 72; tarsus, 22.

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A NEW HUMMING BIRD FROM THE SIERRA NEVADA DE SANTA MARTA, COLOMBIA.

BY OUTRAM BANGS.

While Mr. W. W. Brown, Jr., was collecting birds in 1899 in the higher parts of the Sierra Nevada de Santa Marta, Colombia, he secured at altitudes ranging from 7,500 to 11,000 feet, three specimens of a *Lafresnayea*, which at the time I called *Lafresnayea saul* (Delat. and Bource.).

Since then I have compared these skins with many specimens of *L. saul* and *L. lafresnayei* (Boiss.) and find that the Santa Marta mountain bird is quite different from either. It may be known as

Lafresnayea liriope sp. nov.

Type, from Paramo de Chiruqua, 11,000 feet altitude, Sierra Nevada de Santa Marta, Colombia, adult ♂, No. 6216, Bangs Coll., Museum of Comparative Zoology. Collected February 25, 1899, by W. W. Brown, Jr.

Characters.—With the rectrices (except of course the middle pair) *white*, below the dark tips, as in *L. saul*, but with the bill nearly straight as in *L. lafresnayei* (which has the rectrices *yellow* below the dark tips) very different from the much curved bill of *L. saul;* central pair of rectrices and longer upper tail coverts, strong greenish coppery, in marked contrast to color of back. In all skins I have examined of *L. saul* the central rectrices and upper tail coverts are green, concolor with back. In most skins of *L. lafresnayei* the central rectrices are slightly bronzy, not so much so however as in the Santa Marta form, but this character and the straighter bill would seem to indicate, that in spite of having a white tail the new bird is really more nearly related to the yellow-tailed *L. lafresnayei* than to *L. saul*.

MEASUREMENTS.

No.	Sex.	Locality.	Wing.	Tail.	Exposed Culmen.
6216	♂	Santa Marta Mts. 11,000 ft.	64.	38.	24.
6217	♂	" " " 7,500 ft.	63.	37.5	24.5
6218	♀	" " " 9,000 ft.	62.5	38.	24.5

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A NEW TINAMOU FROM LAKE TITICACA.

BY OUTRAM BANGS.

Among the birds collected for the Museum of Comparative Zoology by Mr. S. Garman at Lake Titicaca, where in 1875 he accompanied Dr. Alexander Agassiz in his explorations of this lofty sheet of water, were two examples of a *Nothura*.

Dr. J. A. Allen, in his list of the birds of the expedition (Bull. Mus. Comp. Zool. Vol. III, p. 355, July, 1876), referred these specimens to *Nothoprocta branickii* Tacz, thus obscuring until now the fact of the occurrence of a *Nothura* on the western side of the great Andean divide.

As might be expected from its isolated position—no other member of the genus occurring nearer it than in the high plateau of southern Bolivia east of the Cordillera Real—the Lake Titicaca "Perdiz" is a very distinct species. In memory of the great naturalist who undertook the expedition, during which the specimens were secured, it may be known as—

Nothura agassizii sp. nov.

Type from Moho, on the northern border of Lake Titicaca, adult (not sexed) No. 24,295 Coll. Mus. Comp. Zool. Collected (between Jan. 1 and March 5) 1875 by S. Garman.

Characters.—Belonging to the section of the genus characterized by very fine spottings and vermiculations of the upper parts, that includes *N. boraquira* (Spix) of Brazil and western Argentina and *N. darwini* Gray of Patagonia; upper parts much blacker than in either of these, the vermiculations very fine and the pale edges of the feathers very narrow; under parts pale—exactly buff of Ridgway; the dark markings on chest and fore neck very pronounced and consisting in wide transverse bars of dusky directly across the feather; whole lower sides and flanks immaculate, the dusky markings stopping at sides of breast. Size about as in *N. boraquira*, but the tarsus shorter and the toes very short. Type, unsexed, wing, 140; tarsus, 29.5; middle toe with claw, 24.5; exposed culmen, 16.5.

Vol XXIII, pp. 109-110 July 23, 1910

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JÆRA LONGICORNIS LUCAS REFERRED TO THE GENUS *STENETRIUM*.

BY HARRIET RICHARDSON.

[Collaborator, Division of Marine Invertebrates, U. S. National Museum.]

In 1849 Henri Lucas described a new species of *Jæra* which he called *J. longicornis*. Recently in referring to the Exploration Scientifique de l'Algérie, where the description was published,* I noticed that the form does not belong to the genus *Jæra* as now understood, but should be referred to the genus *Stenetrium* Haswell,† a genus described much later, in 1881, and of which *S. armatum* is the type.

In 1886 Bovallius ‡ established the genus *Jamna* for *Jæra longicornis*, and also placed *Jæra filicornis* Grube § in this genus. *Jamna* therefore must now be considered a synonym of *Stenetrium*. Beddard || also in 1886 remarks that *Jæra longicornis* has been wrongly assigned to the genus *Jæra*, but does not place it in any other genus. *Jæra longicornis* was first recorded from Algeria, but has since been found at Lesina in the Adriatic according to Heller.¶

Jæra filicornis Grube was considered by Heller to be identical with *Jæra longicornis*. Finally, in 1893, Stebbing** refers to *Jamna longicornis*, thus recognizing the genus *Jamna*.

Dr. H. J. Hansen,†† in his conspectus of the genus *Stenetrium*, mentions all the species described before 1905, but seems to have

* I, p. 66, IV, pl. 6, fig. 4.

† Proc. Linn. Soc. New South Wales, V, p. 479, pl. XIX, fig. 1.

‡ Bihang till K. Svenska Vet.-Akad. Handlingar, XI, No. 15, pp. 22–24.

§ Die Insel Lussin, 1864, p. 75.

|| Challenger Report, XVII.

¶ Verh. K. K. Zool.-bot. Gesellsch. in Wien, XVI, 1866, p. 733.

** Hist. Crust., 1893, p. 379.

†† Proc. Zool. Soc. London, 1904, II, Pt. 2, 1905, pp. 316–330, pl. XIX, figs. 2*a*–2*h*.

overlooked *Jæra longicornis* Lucas. The new species described by him as *S. mediterraneum* is probably a synonym of *Stenetrium* (*Jæra*) *longicornis*, as a comparison of the figures of the two authors will show.

Since the publication of Hansen's paper, four new species have been added to the genus. *Stenetrium chiltoni* from Ceylon was described by Stebbing * in 1905, and Nobili † in 1907 described three new species from Polynesia. Stebbing has referred *S. inerme* to the genus *Notasellus* Pfeffer, so that the genus *Stenetrium* now includes the following thirteen species: *S. armatum* Haswell, *S. fractum* Chilton, *S. haswelli* Beddard, *S. stebbingi* Richardson, *S. serratum* Hansen, *S. occidentale* Hansen, *S. antillense* Hansen, *S. siamense* Hansen, *S. chiltoni* Stebbing, *S. hanseni* Nobili, *S. euchirum* Nobili, *S. proximum* Nobili, and *S. longicornis* (Lucas).

* Ceylon Pearl Oyster Fisheries, 1905, Pt. IV, pp. 55–57.

† Mem. R. Acad. Sc. Torino, (2), 57, 1907, pp. 411–417.

Vol. XXIII, pp. 111-114 July 23, 1910

PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

ON THE SCALES OF SOME MALACOPTERYGIAN FISHES.

BY T. D. A. COCKERELL.

In the endeavor to trace the evolution and relationship of the scales of the Teleosts, and through these of the fishes themselves, it was obviously necessary to become acquainted with as many as possible of the families and genera of that great assemblage classed by Boulenger as Malacopterygii, and placed by him at the base of the Teleostean system. Many of the smaller Malacopterygian families, however, consist of fishes which are rare and difficult to obtain, and I could have made little progress but for the great kindness of Dr. G. A. Boulenger in sending me scales of *Notopterus*, *Heterotis*, *Pantodon*, *Phractolæmus* and *Knenia*,* and of Dr. D. S. Jordan in contributing scales of *Chirocentrus*. In some future paper I hope to figure all these scales, but the results of their examination are so interesting that they deserve to be put on record without delay.

Osteoglossidæ.

Heterotis niloticus Ehrenb. Large oval scales with the exposed portion thick and corrugated, with a more or less vermiform sculpture; base rounded or narrowed (as in Mormyridæ), not at all truncate; radial sculpture throughout a large-meshed network, quite in the manner of the Mormyridæ, but better developed, and covering the basal as well as apical area; circuli resolved into granules, but in the lateral field remaining as well formed though moniliform lines. This is the only scale known to me, outside of the Mormyridæ, having the true Mormyrid form and pattern. Are we to see in the Osteoglossids the ancient type from which the Mormyrids came? There is a curious superficial similarity in the fishes themselves; thus compare *Mormyrops* with *Osteoglossum*, *Dapedoglossus* with *Petrocephalus*. The dif-

* Dr. Boulenger notes that all are from the middle of the side, above the lateral line

ferences in structure, however, are considerable, and I do not wish to suggest that the scales should count against a positive opinion of experts in fish-anatomy that the suggested relationship is impossible.

A chance to examine the other three living Osteoglossid genera is of course eagerly awaited.

Notopteridæ.

Notopterus afer Gthr. Elongate (oblong) scales, with rounded corners; nuclear area far apicad; circuli extremely fine, the apical transverse; apical radii numerous but rudimentary, wholly submarginal; basal radii about 22, very long, very well developed, the middle ones inclined to be wavy; basal margin not at all scalloped. Boulenger compares this family with the Hiodontidæ, and the scales are of the same general type, although readily separable. They do not at all resemble those of the Mormyrids or Osteoglossids. In general appearance, the Notopterids are very unlike the Hiodontids.

There is a distinct, even close, resemblance between the scales of *Notopterus* and *Gadus*. This is singular, because the Gadidæ are supposed to have been derived from some Macruroid form, and the Macruridæ are superficially much like the Notopteridæ.

Macrurid scales I have never seen.

Pantodontidæ.

Pantodon buchholzi Peters. Scales subcircular, with rounded but evident laterobasal angles; nuclear area a little apicad of the center; circuli very well developed, the apical transverse. With a microscope it is seen that the lateral and basal circuli are moniliform, the inner ones actually broken into separable minute elements, while the apical circuli are thickened near the nuclear area, much broken beyond, and lacking in the submarginal field. Radii few and very strong, more basal than apical, the latter more or less branched. In the radii, and general form, this scale is like that of the Alestini and the South American Characinids of the type of *Erythrinus*, *Hoplias*, *Pyrrhulina*, *Chalceus*, *Chalcinus*, etc. It is also like one of the groups of *Barbus*. Boulenger states that the Pantodontidæ are closely allied to the Osteoglossidæ; the scales are very dissimilar, and yet agree well in the character of the circuli, which in both are moniliform or resolved into granules.

Phractolæmidæ.

Phractolæmus ansorgii Boulenger. Scales also of the Alestiform type, with very strong laterobasal angles and few very strong radii; the truncate base is broad and crenulated. The circuli are dense and strong basally and laterally, but apically are very remarkable, every third or fourth being strong and conspicuous, while those between are evanescent, the whole being entirely longitudinal, the strong ones ending in short triangular teeth on the margin; between these strong circuli, in the subapical field, are scattered small circular pits.

Nowhere are the circuli at all moniliform. From the nucleus a radius extends on each side laterally, and from it spring three or four upwardly directed radii, following the lines of the apical circuli; two of these apical radii may start almost from the nucleus. There are three or four strong basal radii.

It thus appears that although the scales of *Pantodon* and *Phractolæmus* may both be described, on superficial characters, as Alestiform, they are extremely different in detail, the whole system of circuli being diverse. The scale of *Phractolæmus* is incipiently ctenoid.

Boulenger states that the Phractolæmidæ are an isolated group, nearest apparently to the Osteoglossidæ.

Kneriidæ.

Kneria cameronensis Boulenger. Minute subquadrate scales of a most peculiar type. At the sides are widely spaced longitudinal circuli, about four in number, and basally and apically are widely spaced radii; between the basal radii are numerous very irregular but mainly transverse broken lines, which seem to represent the circuli. In the middle of the scale, over a large area, the radii and other markings become very strongly zigzag, producing a very singular pattern. I do not know anything like this, unless it is the Rhodeine Cyprinidæ, in which the radii become more or less zigzag. There is a certain suggestion of *Umbra*, but on comparison it seems to be fallacious.

This family was formerly placed among the Haplomi, but in Boulenger's work on African fishes follows the Phractolæmidæ. The fishes have a Cobitoid appearance, but the scales do not resemble those of the Cobitids.

Chirocentridæ.

Chirocentrus dorab (Forsk.). Cavite, Philippine Islands. Scales altogether Clupeoid, differing however from all Clupeidæ seen in having the apical field with five transverse circuli, much less dense than those of the basal field, the latter sometimes evanescent. Transverse radii as in the Clupeids. One scale is elongate, the long basal field free from circuli, and with about twelve wholly longitudinal radii, which do not run to a nucleus, but connect with the apical radii. This must be abnormal.

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PROCEEDINGS

OF THE

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DESCRIPTION OF A NEW SOLITARY SPADEFOOT (*SCAPHIOPUS HURTERII*) FROM TEXAS, WITH OTHER HERPETOLOGICAL NOTES.

BY JOHN K. STRECKER, JR.

Baylor University, Waco, Texas.

Cope and other herpetological writers have included the eastern half of the State of Texas in the range of the Solitary Spadefoot (*Scaphiopus holbrookii* Harlan), but have cited no definite localities for specimens.

In June, 1904, the present writer captured a spadefoot of this type near Refugio, Refugio County, and recorded it as a "typical example of *S. holbrookii*," but later was uncertain as to whether he was justified in inserting the word *typical*. In as much as this specimen possessed the conspicuous parotoid glands, distinct tympanum, and in a way, general appearance of the eastern species, in these particulars differing from *Scaphiopus couchii* B. and G. and *S. hammondii* Baird of the Sonoran and Central Zoological districts, the reference was, in a measure, correct. On the other hand it differed from *holbrookii* in many particulars, being characterized by a peculiarly narrow and compact form, for a *Scaphiopus*, and possessing a remarkably short and blunt head.

On the night of April 13, 1910, while collecting toads in and around temporary breeding pools on an elm flat about 3½ miles east of the city of Waco, I captured a second example of the same type. By the dim light of a lantern I was at first under the impression—on account of its greenish coloration, tubercular upper surfaces and high round parotoids—that I had captured a large *Bufo punctatus* B. and G., and did not realize the importance of my find until after I had reached the house on my return.

The temporary pools on the flats were swarming with common toads, but the spadefoot, a single *Lithodytes latrans* Cope and a large smooth-skinned *Hyla* were found hopping around among dead leaves a yard or more from the water. Before reaching these pools I could distinguish the voices of the common toad, the narrow-mouthed toad (*Engystoma texense* Girard) and a spadefoot. If other specimens of the latter were present they concealed themselves so effectually that I was unable to discover them.

This type of spadefoot must be exceedingly rare in Texas. I have collected and examined hundreds of *Scaphiopus* in several sections of the State, but with the exception of the two above mentioned, all have been specimens of *S. couchii*.

I am fully satisfied after making careful comparisons between my specimens and examples of *Scaphiopus holbrookii* from North Carolina that the Texan form is a distinct species. It requires comparison only with the eastern spadefoot, from which it may be distinguished by its more compact form, narrow head, blunt muzzle, unusually high parotoids, smaller palmar tubercles and shorter hind limbs. The sides, buttocks, tibia and posterior portion of the abdomen are covered with tubercles instead of being almost perfectly smooth. The tubercles on the upper surfaces are more uniform in size.

I dedicate this interesting species to Mr. Julius Hurter, the well-known herpetologist of St. Louis, Missouri, in recognition of his generosity and encouragement to me in my herpetological studies.

Scaphiopus hurterii sp. nov.

Plate II, figures 3 and 4.

Type from Waco, Texas ($3\frac{1}{2}$ miles east). No. 4179, Baylor University Collection. Adult male. April 13, 1910. Collected by J. K. Strecker, Jr.

Habitat.—Eastern half of Texas.

Material.—One specimen from Refugio, Texas, in addition to the type.

Description.—Size medium. Length of head and body, 67 mm. Head short, length about equal to width. (In *holbrookii* the head at angle of jaws is much wider than long.) Snout heavy and blunt, not extending beyond the mouth. Parotoids nearly round, higher and even more conspicuous than in the eastern species. Tympanum distinct but rather smaller than in *holbrookii*. (In type hardly more than half the diameter of the parotoid.) Crown distinctly rugose. No black granules in space between and in front of the eyes. Upper surfaces with small, closely set

Fig. 1.

Fig. 2.

Fig. 3.

Fig. 4.

Fig. 1. *Engystoma arcolata* Strecker.
Fig. 2. *Eumeces pachyurus* Cope.
Figs. 3 and 4. *Scaphiopus hurterii* Strecker, new species.

tubercles very uniform in size and distribution. Many tubercles on sides, buttocks and posterior portion of the abdomen. Many pustules on upper surface of tibia. Glands on thorax present, conspicuous. Enlargements resembling glands on inferior surface of femur (present in both specimens). Spade-like process of foot narrowly margined with black. Palmar tubercles rather small. Fingers slender. Tibia about equal to that of *S. holbrookii* but femur and foot much shorter.

Color above, pale greenish, with a pale yellowish line from each orbit; these converge again on the coccyx. Upper surface of head and area between the light lines, dark plumbeous. Parotoids olive. Sides of head and under surfaces yellowish-white.

The Refugio specimen is slightly smaller. (Length 63 mm.) Coloration in life darker. Greenish above, light lines inconspicuous. In form and other important characteristics resembling the type.

Engystoma areolata Strecker.*

Plate II, figure 1.

The specimen illustrated is a cotype (Baylor University Collection No. 4086) from Victoria County, Texas. The figure, which is from a worked over photograph, gives a very fair idea of the general appearance of this rough-skinned, brightly marked little toad.

Hyla versicolor chrysoscelis Cope.

Hyla femoralis chrysoscelis Cope, Bull. U. S. Nat'l Mus., No. 17, 1880, p. 29.

Cope's brief description of this variety is as follows: "*Hyla femoratis* Daudin. A specimen larger than the largest individuals I have previously seen; differs also in the greater extent of the palmation of the fingers, and in the coloration of the concealed surface of the femur. In eastern specimens the posterior surface of the femur is brown, with rather small yellow spots; in this form it is yellow, with a blackish coarse reticulation, which only extends to the lower surface on the proximal half of the thigh. The sides have a double row of small black spots, which enclose a yellow band. This is probably a subspecies and may be distinguished by the name of *chrysoscelis*. One specimen as large as a large *Hyla versicolor* was taken by Mr. Boll near Dallas."

A number of tree-frogs obtained by Combs at Hot Springs, Arkansas, were identified as *Hyla chrysoscelis* by Dr. Stejneger. In the latter's letter to Mr. C. S. Brimley, who sent him the specimens, attention was called to the fact that *chrysoscelis* is related to *versicolor* and not to *femoralis*. Several *Hylas* collected at Waco, Texas, a year or two later agreed in all important characters with those from Hot Springs. Miss Dickerson, in her "Frog Book," ignores this subspecies but records *Hyla femoralis* from Texas on the authority of Cope!

It seems strange to me that Cope should refer this form to *femoralis*, even as a variety. It clearly indicates to my mind that the type must have been a smooth-skinned animal, in this respect resembling Daudin's species.

* Proc. Biol. Soc. Wash., 1909, XXII : 118.

Hyla versicolor chrysoscelis is certainly worthy of a subspecific name, although the one given by its author is hardly fitting. The reticulation of the femur he describes is a common character of western examples of *versicolor*. It agrees with *femoralis* in having a smooth skin but in no other important character. *Hyla femoralis* is a smaller frog, lacks the light spot under the eye so characteristic of *versicolor* and differs in the extent of the palmation of the fingers. It also has a dark line through the eye and ear not present in *versicolor*.

Chrysoscelis differs from *versicolor* in having the skin of the upper surfaces almost perfectly smooth, only a few tubercles being present along the margin of the snout and on the eyelids. The light spot under the eye, in living specimens, is invariably yellow. The color pattern is much the same as in the typical subspecies.

This spring I found this tree-frog breeding in small rock-bound pools in a gravel pit. The tadpoles were light yellow. Specimens collected April 21st had the hind-limbs well developed.

Eumeces pachyurus Cope.

Plate II, figure 2.

This skink was described by Cope* from a single example collected by Jacob Boll near Dallas, Texas. According to the author, the specimen had been temporarily mislaid and he was unable to give a figure of it. The same statement is repeated in his monumental posthumous work on the Crocodilians, Lizards and Snakes published by the National Museum in 1898. No other specimen has since been placed on record.

On April 6, 1910, I stirred a small dark brown lizard with two light lateral lines on each side, from among some drift material which had accumulated at the base of an *Opuntia leptocaulis*, in a wooded pasture about 3 miles east of the city of Waco. It was very agile in its movements but I succeeded in capturing it before it could enter its burrow under the roots of the *Opuntia*. As it was the first *Eumeces* of its type that I had ever seen, I redoubled my efforts and a few minutes later brought another specimen to light from under a mass of dead leaves only about a yard away. This one also attempted to enter a burrow at the base of an *Opuntia*, but its movements were much slower than those of the other example, its weak limbs appearing to be of little service in carrying forward its long body and heavy, thick tail. This specimen was much larger than the first one and was apparently a well-grown adult. The color was much lighter but the color pattern was identical.

The soil of the pasture is sandy and the lizards were captured on the side of a draw which carries the water from the truck farm above down to a small slough nearly an eighth of a mile below. On both sides of the draw are thick growths of scrubby trees—*Quercus breviloba, Ulmus alata, Gleditsia triacanthos* and *Juniper sabinoides*. Opuntias, both *leptocaulis* and the common heavy-stemmed variety, grow around the bases of these trees. Specimens of *Leiolepisma laterale* Say and *Haldea striatula* Linn. were also found under the roots of these plants, but although I spent five days in the vicinity, I was unable to find any more examples of the skink.

* Bull. U. S. Nat'l Mus., No. 17, 1880, p. 19, 39.

Following are descriptions of my two specimens which I refer to Cope's lost *Eumeces pachyurus*.

(1) No. 4112, adult. Length of head and body, 67 mm.; vent to tip of tail, 88 mm.; from ear to muzzle, 12 mm.; of hind limb, 13 mm.; of fore limb, 16 mm. Tail long and thick, slightly depressed at base, not perfectly cylindrical for first 12 mm. of length; 24 mm. in circumference for first 25 mm. of length. (Measurement around body at insertion of fore limbs only 30 mm.)

No postnasal plate. Anterior loreal elevated, as high as long, and reaching the transverse interfrontonasal plate, as in the type. Other headplates as in original description of the species. Color above, light brown. Head and upper labials olive. Inconspicuous dark borders to labials. Underparts white (pure white on throat and chin—bluish white posteriorly). Two narrow light lines on each side; white in color and with the enclosed area between each pair black. A narrow black border above upper and below lower light stripes. The dark area between the lateral lines occupying one whole and two half scales. Six scales between the two upper light lines which extend to within 30 mm. of the end of the tail. A few scattered dorsal scales are black spotted (27 in 40 mm. of length). Limbs smaller than in examples of *Eumeces brevilineatus* Cope and *E. tetragrammus* Baird of approximately the same size. Claws noticeably smaller and weaker than in an example of *tetragrammus* only 60 mm. in length (head and body). Rows of scales, 26. No dark borders to any of the dorsal scales.

(2) No. 4113, juv. Body heavier than in examples of *Leiolepisma laterale* of medium size but length about equal. Tail short, thick at base, length about equal to head and body. Color above, rich brown, tinged with bronze in the living animal. Each dorsal scale with a dusky spot at base. Upper surfaces of limbs dark brown. Lateral light lines yellow, enclosed area coal black. Underparts bluish, excepting on chin and throat, which are white. A heavy black line above upper light stripe; a dusky line along lower border of lower light stripe. The immaturity of this specimen will account for its rich dark coloration and the difference in the proportions of the tail. Cope states that in the young *E. tetragrammus* the sides and limbs are scarcely darker than the back, which is certainly not the case in the young of the present species.

For comparison with these specimens I had examples of the following species of skinks from Texas: *Eumeces quinquelineatus* Linn., *E. obsoletus* B. & G., *E. guttulatus* Hallowell, *E. multivirgatus* Hallowell, *E. anthracinus* Baird, *E. brevilineatus* Cope and *E. tetragrammus* Baird.

Alligator mississippiensis Daudin.

The Texan range of the alligator is yearly becoming more restricted. In an attempt to outline its present distribution I have been greatly handicapped by a lack of definite locality records but I occasionally come into possession of some data of real value. Recently, Mr. Turner Hubby and two other gentlemen killed a nine-foot specimen in a marsh along the Trinity River, about three miles south of Dallas. In 1909 a German boy

caught a two-foot example on the Bosque River, about five miles north of Waco. In February of this year a specimen $3\frac{1}{2}$ feet in length was caught on a hook on a "trot" line in the Brazos River not over a mile south of Waco.

The Waco specimens may possibly have escaped from captivity but Mr. Hubby informs me that the Dallas specimen had every appearance of being an old resident and was killed in a form among drift material which it had probably occupied for some time.

Zamenis constrictor flaviventris Say.

The western variety of the blue racer or black snake is very variable in color. A specimen 612 mm. in length, collected near Waco by Dr. J. L. Kesler, represents the transition stage between the spotted (young) phase and the plain colored adult and is worthy of description.

Color above, olive green, darkest on dorsal region. Head brownish-olive, unspotted. Iris yellow. Upper surface of body with black spots on the scales, these disappearing on the posterior sixth of its length. These spots form broken rhomboids along the dorsal line and are edged with chestnut. Only about two out of every four scales show the black coloration. On separating the scales on the lateral portion of the body, the skin shows black underneath. Along the lateral line (rather, point of division) every other scale is marked with a black fleck. The chin, upper and lower labials and anteorbital scales are pure white. Underparts light yellow, changing to white in the anal region and on the tail. From two to four blackish spots, surrounded by pink, on each gastrostege. Upper surface of tail brownish-olive, unspotted. Superior labials 7–7. Ventrals 175. This specimen combines the characters of the eastern and western subspecies. In another specimen 459 mm. in length the dorsal blotches were bright red.

Coluber emoryi B. & G.

Two examples of this species were recently captured near Waco and are now in the Baylor University Collection. The first, an adult 940 mm. in total length, was sent in alive and was the most pugnacious snake that I have ever handled. When first received it was in splendid condition, indicating that it had taken food quite recently. About the end of the third week of its captivity it became restless and an examination disclosed the fact that it was preparing to shed its skin. Thinking to hasten the operation, I offered it eggs, mice, toads and lizards but it absolutely refused to accept anything in the way of food. One morning about a week later I found it dead in its cage, with the skin of the sides loosened in patches and the new skin underneath only partially formed.

The second example was a young female about 400 mm. in length. Both were captured on a prairie farm some five or six miles from the city. Our common *Coluber* (*C. obsoletus confinus* B. & G., according to A. E. Brown or *C. spiloides* D. & B. according to Cope) inhabits timbered districts and is a better dispositioned snake.

Terrapene carolina triunguis (Agassiz).

This box tortoise inhabits the eastern half of Texas, but is by no means common. Examples have been recorded from Colmesneil, Tyler County (C. S. Brimley), Demings Bridge, Matagorda County (S. W. Garman), Gainesville, Cooke County (F. W. Cragin), and San Antonio, Bexar County (H. C. Yarrow). Last October Prof. J. L. Kesler found a specimen in Gurley's bottom, two miles south of Waco. It was concealed in a patch of tall weeds and was discovered only by accident. Since its capture it has been confined in a small enclosure. It spent the winter in a shallow cavity in the hard ground, under cover of a mass of dry moss and weeds.

It is an adult. The shell is unsymmetrical, the plates on the right side being much wider and longer than those on the left. Carapace above, olive, without traces of the usual obscure markings of this subspecies. Keel distinct. Neural plates indistinctly margined with black. A black spot at base of each marginal. Plastron light yellow, the plates margined with black. Top of head light chocolate. Iris orange red. Upper jaw, chin and throat, light yellow. A few scattered scales on throat orange red. Upper surfaces of limbs light chocolate. Inner surfaces of fore-limbs orange red. Hind foot with three toes.

Waco is well within the range of this animal, and it seems strange that it should have been so long overlooked.

Aspidonectes emoryi Agassiz.

"Though this species is closely related to the southeastern soft-shelled turtle (*T. ferox*) there are no tubercles on the front margin of the carapace"—Ditmars, "The Reptile Book," N. Y., 1907, p. 78.

I beg to differ from Mr. Ditmars and others who have made the same distinction. I have adult examples of *A. emoryi* which have from 14 to 18 conical tubercles on the front margin of the carapace. Dr. Siebenrock referred a specimen of this type (labeled by me *A. emoryi*) to *A. spinifer* but afterward changed his opinion and recorded it under its correct name. I have young examples 4 inches in length in which the tubercles are already in process of formation and are represented by very small round knobs.

In *Aspidonectes ferox* the carapace is olive or brownish olive with dull blotches or black rings; in *emoryi* it is olive with numerous white dots. In the former species young specimens and adults differ in coloration; in the latter they are similar. *A. ferox* is much the larger turtle. Both species occur in some localities in the eastern half of Texas (Brownsville [Yarrow], Bullhide Creek, McLennan County [Baylor Univ. Coll.]).

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PROCEEDINGS

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BIOLOGICAL SOCIETY OF WASHINGTON

GENERAL NOTES.

NOTES ON SOME NAMES OF LIONS.

The names for three subspecies of lions, *Felis leo barbarus* for the animal of extreme northern Africa, *Felis leo persicus* for the form found in western Asia, and *Felis leo senegalensis* for the Senegal Lion, have heretofore dated from Fischer's "Synopsis Mammalium," 1829. Through the courtesy of Dr. C. W. Richmond I have been able to examine a work by J. N. von Meyer, published in Vienna about August 1, 1826, in which all three of these forms are properly named and diagnosed. Fortunately the names here used are exactly the same as those in current use, with the exception of the first, which is given as *barbaricus* instead of *barbarus*. The title of the work is as follows: "Dissertatio inauguralis anatomico-medica de Genere Felium," etc., by Joannes Nep. nobilis de Meyer. There can be no possible doubt as to the time of publication as the introduction is dated July 12, 1826, and the title page advertises a discussion at the Vienna University for August 5, 1826. The descriptions occur on page 6. These three subspecies of the lion will stand as *Felis leo barbaricus* Meyer, type locality Barbary; *Felis leo persicus* Meyer, type locality Persia; and *Felis leo senegalensis* Meyer, type locality Senegal.

The lion of the Cape Region of South Africa was first named by Fischer in his "Synopsis Mammalium," p. 565, 1829, as *Felis leo* var ϵ *capensis*, and was later recognized as a distinct species by Fitzinger (Sitzb. Akad. Wiss., LVIII, p. 436, 1868), who called it *Leo capensis*. The form nowadays is generally considered a subspecies, under the name *Felis leo capensis*. The name *Felis capensis* was, however, previously used by Forster (Phil. Trans. R. Soc., LXII, p. 1, 1781) and Gmelin (Syst. Nat., I, p. 81, 1788) for the serval of South Africa. The name *capensis* obviously can not be used for any form of the lion.

A valid specific name for the Cape Lion is found in the *Leo melanochaitus* of Charles Hamilton Smith in his "Introduction to Mammalia," Jardine's Naturalists Library, Vol. XV, second edition, page 177, 1858. On plate X this name occurs as *Felis* (*Leo*) *melanochoetus*. As in another instance in the same work the engraver is evidently responsible for this difference in the spelling of the specific name on the plate. The Cape Lion will therefore stand as *Felis melanochaitus* (Smith).

—*N. Hollister.*

THE USE OF *EPIMYS* IN A GENERIC SENSE.

In his recent paper on the genus name of the rats (Proc. Biol. Soc. Washington, Vol. XXIII, p. 57) Mr. G. S. Miller appears to be under the impression that he is the first to reuscitate Dr. Trouessart's subgeneric name *Epimys* and to employ it in a generic sense. This, however, is not the case, for Dr. K. A. Satunin employed the name *Epimys norwegicus* for the brown rat on pages 19 and 71 of a paper in Vol. IV of *Mitteilungen des Kaukasischen Museums*, Tiflis, 1908. I may add that if it is considered necessary to separate the rats from the mice under a distinct name, in my opinion subgeneric rank is sufficient; so that we should have *Mus* (*Epimys*) *norregicus* and *M.* (*E.*) *rattus*, as originally proposed by Tronessart.

—*R. Lydekker.*

INCUBATION PERIOD OF BOX-TURTLE EGGS.

So few data have been published on the subject, that it seems advisable to record the following observations: A box-turtle (*Terrapene carolina*) was found June 16, 1908, depositing its eggs on the south side of a high dry knoll at Viresco, Va. The eggs had not hatched August 23, but on August 26 the young had dug their way to the surface and left behind them the fragments of the shells. The period of incubation was therefore 70–72 days.

—*Wells W. Cooke.*

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PROCEEDINGS

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A NEW MUSKRAT FROM THE GREAT PLAINS.

BY N. HOLLISTER.

The muskrat of the Great Plains region of the western United States proves to be one of the best characterized forms in the group.

Fiber zibethicus cinnamominus subsp. nov.

Type from Wakeeney, Trego County, Kansas. No. $\frac{30844}{87241}$ Merriam Collection. ♂ adult, skin and skull. Collected by A. B. Baker, January 14, 1887.

General characters.—Smaller than *Fiber z. zibethicus* or *Fiber z. osoyoosensis;* larger than *F. z. ripensis.* Coloration pale, with much more reddish in both fresh and washed out pelage than any of these forms. Skull smaller than that of *zibethicus* or *osoyoosensis*, with smaller teeth.

Color.—Fresh pelage: Upperparts and sides cinnamon brown, dorsal area only slightly darker, with few black hairs. Nose to forehead and eyes seal brown. Cheeks and underparts creamy clay color, lighter on neck, throat, and inner sides of legs. A very small brown spot on chin. Feet drab; nails yellowish; tail dark brown. Worn or washed out pelage: Varying from wood brown to russet. Specimens in the short-haired early fall pelage are the darkest, and those in extreme faded early summer coat are the lightest.

Skull and teeth.—Skull smaller than that of *Fiber z. zibethicus*, with smaller teeth; larger than that of *F. z. ripensis.* Compared with skulls of *zibethicus* it has a proportionally shorter and heavier rostrum, accompanied by a shortening and widening of the nasals.

Measurements.—The type specimen is without flesh measurements. Two other specimens from the type locality measure: Total length, 489; 503; tail vertebrae, 237; 243. Average of hind foot in twenty-one specimens from various localities on the Great Plains, 73.5. Skull of type: Basal length, 55.9 (56.3)*; zygomatic breadth, 34 (35.5); palatal

*Measurements in parentheses are the averages of five skulls of adults from the type locality.

length, 35 (35.5); length of nasals, 19.5 (19.5); breadth of nasals, 8.6 (8.9) alveolar length of upper molar series, 14.2 (15).

Remarks.—This is the muskrat of the prairie streams and sloughs of the interior Great Plains region. In color it exhibits the maximum amount of reddish, and, with the exception of *Fiber z. pallidus* of Arizona, the minimum amount of black. It intergrades with *Fiber z. zibethicus* and *Fiber z. osoyoosensis* on the borders of the Great Plains. My thanks are due to Dr. C. Hart Merriam for the privilege of describing this form from his collection.

Specimens referable to this subspecies have been examined from southern Manitoba, North and South Dakota, eastern Montana and Wyoming, Nebraska, eastern Colorado, Iowa, Kansas and northern Texas.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

URSUS SHELDONI, A NEW BEAR FROM MONTAGUE ISLAND, ALASKA.

BY C. HART MERRIAM.

Since it is not likely that my work on the American Bears will be completed during the present year it seems desirable to place on record the description of a large and remarkable new species from Montague Island, Alaska, of which five specimens of both sexes and different ages were obtained in May, 1905, by Charles Sheldon; and three additional specimens in 1908 by Miss Annie M. Alexander, all of which have been generously placed at my disposal for study.

Montague Island lies in the western part of the mouth of Prince William Sound, in latitude 60 degrees, only about 20 miles distant from the east shore of Kenai Peninsula—the home of *Ursus kenaiensis*. It is not surprising therefore that the Montague Island bear proves to be related to *kenaiensis*. The two together form a group quite apart from all the other known species.

It is peculiarly fitting that the Montague Island bear should be named in honor of its discoverer—Charles Sheldon of New York—who by zeal and perseverance in the face of many obstacles succeeded in killing five, and generously presented the specimens to the U. S. Biological Survey.

The new bear may be known from its only near relative, *Ursus kenaiensis*, by the following description:

Ursus sheldoni sp. nov.

Type.—No. 137,318, ♂ ad., U. S. National Museum, Biological Survey Collection. Montague Island, Alaska, May, 1905. Charles Sheldon. Original number 17.

Characters.—Size large; claws of adult long and of the grizzly type; hairs over shoulders elongated to form a small but distinct hump; ears dark, with whitish tips; general color brownish, varying from pale to dark, the hairs of the back sometimes yellowish tipped, those of the head grizzled; color darkest (almost blackish) on belly, legs and feet. An old she bear killed by Sheldon May 18, 1905, is very pale grizzled gray on the upperparts, and only moderately darker on the legs and feet. The cub of this bear, killed the same day, was in its 2d year (about 16 months old) and is very pale—almost buffy gray—with dark feet and legs and a strongly marked hump.

Cranial Characters.—Skull in general similar to that of *kenaiensis* but basisphenoid broader and flatter, its length nearly equal to that of basioccipital; posterior roots of interpterygoid fossa more widely spreading; *condyle of jaw more exserted* [in *kenaiensis* sessile], reaching so far back that a line dropped from peak of coronoid to tip of angle touches or traverses it [in *kenaiensis* this line passes freely behind the condyle]; coronoid, in females of same age, smaller and lower—its area for muscular attachment less; ramus of jaw strongly bellied posteriorly, its inferior border below the coronoid *strongly convex downward* and curving evenly, with only a very slight break, to angular process. [In *kenaiensis* the inferior border of ramus is *nearly straight* (*not* appreciably bellied under coronoid) and ends abruptly in a step or jog at some distance behind the angle.]

In general form and appearance skulls of females closely resemble those of female *kenaiensis*, differing chiefly in the characters above mentioned and in certain dental peculiarities—notably the smaller size and more pointed heel of the last upper molar, and the oblique truncation of the 1st upper molar.

Skulls of males differ widely from those of *kenaiensis*. Only two full grown males of *sheldoni* and one of *kenaiensis* are available for comparison.* The two adult ♂ skulls of *sheldoni*, while full grown, are by no means so old as the old male *kenaiensis*, compared with which they are decidedly larger (averaging 2 inches longer), much higher, more massive, broader across the squamosals and also across the frontals (both interorbitally and postorbitally). The ramus of the jaw is decidedly broader, and its inferior border more bellied and convex posteriorly. The sagittal crest does not reach the frontals [in the old ♂ *kenaiensis* it reaches to *middle* of frontals]; the frontals arch well upward, are traversed by a broad median sulcus, and swollen above and behind the orbits; the nasals

*Those of *sheldoni* are the type, No. 137,318, collected by Sheldon in 1905; and a slightly older male of approximately the same size (No. 970, Mus. Vert. Zool., University of California), collected and loaned by Miss Annie M. Alexander (killed by her hunter, A. Hasselborg, July 31, 1908, at McLeod Harbor, Montague Island). The old male *kenaiensis* (No. 8916, Museum Vert. Zool., Univ. Calif.) was collected by Andrew Berg for Miss Annie M. Alexander, to whom I am indebted for the privilege of comparing it with skulls in the Biological Survey collection. It is very old and presents the maximum development of crests and ridges—the sagittal crest being very long and high, slightly convex, and reaching anteriorly to middle of frontals—the temporal ridges spreading thence at a right angle to the postorbital processes.

are broad and long (in the type specimen reaching plane of postorbital processes).

Dental Characters.—Teeth in general of the grizzly type. Last (4th) lower premolar normally with horizontal heel, slightly upturned at posterior end, and shallow median sulcus reaching from cusp to end of heel, its defining ridges ending in slightly developed posterior cusplets. [In *kenaiensis* the last lower premolar is more conical, the heel sloping, the sulcus incomplete, with only a single posterior cusplet—on inner side of main cusp posteriorly.] First upper molar peculiar, having both ends *obliquely truncate and parallel*, sloping strongly from outer angles backward and inward; inner row of cusps pushed back so that each falls behind plane of corresponding cusp on outer side; the tooth as a whole more rectangular, its inner corners squarer (less rounded), and inner side more flattened and much less convex than in *kenaiensis*.

In the females the last lower molar is conspicuously smaller than in *kenaiensis*, and the last upper molar is smaller, narrower, more wedge-shape, and more pointed posteriorly. In one of the males it is similar. In the three other males the last upper molar is larger and less acute posteriorly than in the females, and the 3d cusp on the inner side is better developed.

Skull Measurements.—Following are measurements of two adult males—the type specimen collected by Sheldon, and a slightly older male collected by Miss Annie M. Alexander (No. 970, Museum of Vertebrate Zool., Univ. Calif.). In each case the measurements of the type come first, followed in parenthesis by those of the Alexander skull. Basilar length, 360 (355); zygomatic breadth, 270 (272); occipito-sphenoid length, 110 (104); postpalatal length, 163 (165); least interorbital breadth, 102 (99); distance from foramen magnum to plane of front of last upper molar, 242 (235); length of upper molariform series, 72 (75); of upper molars, 57 (61); of lower molars, 71 (72).

Remarks.—The skull of *Ursus sheldoni* is large and massive, and contrasted with those of the big bears of other parts of Alaska (*gyas, middendorffi, dalli*) is short and remarkably broad. The breadth is most conspicuous across the squamosals and frontals. Even the nursing cub shot by Sheldon has the skull strikingly broader throughout than any other cub in the collection. [I have not seen a cub of *kenaiensis*.] Skulls of females are flattened like those of *kenaiensis*. Skulls of males are high and rounded, and those approaching maturity—say in the 4th and 5th years, and doubtless for several years later—have the braincase and frontals so elevated and swollen that were it not for the snout the skulls would appear almost globular.

Another curious feature is that as the skulls lie in a row on the table, those of *sheldoni* have the nose *conspicuously* tilted up. In females the actual difference in height of tips of nasals (above the table) is 8 or 10 mm.; in the males, 35–45 mm. This appears to be due to two causes—the more exserted condyle of *sheldoni*, which throws the jaws a little further forward, and the more bellied basal part of the ramus, which tilts the front part of the skull upward.

It is interesting to note that the 4th lower premolar is distinctly of the grizzly type, while in *kenaiensis* it is variable.

The material on which *Ursus sheldoni* is based is ample to show the constancy of the characters by which the species differs from all other bears. This material consists of 2 adult males, 2 young males (4 or 5 years old), 3 adult females, and 1 cub of the 2d year (about 16 months old).

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

ON A COLLECTION OF FISHES FROM THE OLYMPIC PENINSULA, TOGETHER WITH NOTES ON OTHER WEST COAST SPECIES.*

BY BARTON WARREN EVERMANN AND
HOMER BARKER LATIMER.

In 1897 the late Mr. Cloudsley Rutter and Mr. Elmer R. Brady, under the direction of the U. S. Commissioner of Fisheries, made considerable collections of the fishes of the Olympic Peninsula, Washington. These collections remained unstudied until recently when the present writers had occasion to go over the entire lot. It was found that the collections contain a number of species of special interest, and as the fish-fauna of that region has until now received practically no study it is thought that the publication of this list will prove of interest.

The waters and localities from which specimens of fishes were obtained by Messrs. Rutter and Brady during these investigations are as follows:

Willapa River near Holcomb, July 30; Humptulips, in small creek, August 20; Quiniault Lake, August 23, 24; Beaver Lake, August 24 and September 9; Prairie Creek and Elk Creek, August 25; Raft River, August 26; Tacoma Creek, August 27; Queets River at Evergreen, August 27; Hurst Creek and at Clearwater, August 29; Hah River and Mill Creek, September 1; Snells, in small creek, September 1; Bogachiel, September 3; Ozette Lake, September 4; Pleasant Lake, September 8; Moss Creek, Prairie Creek and Ilwah River, September 11; Crescent Lake, September 17.

All these are in the Olympic region west of Puget Sound.

* Published by permission of the Commissioner of Fisheries.

We take this opportunity to record certain other small collections of West Coast fishes which we have recently examined. They are as follows:

1. A small but interesting collection made in the spring of 1897 in Marin County, Cal. The localities represented are:

Papermill Creek, March 11, 22 and 24; Bear Valley Creek, March 15 and April 7; Olima Creek, April 9; Tomales Bay near Point Reyes, April 28 and May 9, 14; Nicasio and Papermill creeks at junction, April 25, 26; Walker Creek, 5 miles above mouth near Tomales, Cal., May 5 and 18.

2. In 1890 and again in 1891 Dr. Charles H. Townsend, then naturalist on the steamer *Albatross*, while making a study of the shrimp fisheries of San Francisco Bay, obtained and preserved a number of fishes taken in the nets of the Chinese shrimp fishermen. The localities represented are the following:

Mare Island, April 16, 1890; San Pablo Bay, November 8, 1890, and May, 1891; Angel Island, November 7, 1890; San Bruno Point; San Mateo Camp; and South Belmont Oyster Beds.

3. A few specimens obtained by the U. S. Biological Survey in British Columbia, at Malaspina Inlet, July 19, 1897; and Rivers Inlet, June, 1904.

4. A few specimens collected in 1901 by Prof. T. D. A. Cockerell at San Pedro, Cal.

5. A small collection made August 14, 1908, by John Treadwell Nichols at Chinook, Wash.

6. A single jar of specimens obtained by the steamer *Albatross* at Barclay Sound, September 27, 1888.

The above statement regarding collectors, dates and localities will enable one to understand readily the brief locality references in connection with each species in the following list.

These collections, embracing a total of 1,391 specimens, have all been deposited in the United States National Museum.

ANNOTATED LIST OF SPECIES.

1. **Entosphenus tridentatus** (Gairdner).

THREE-TOOTHED LAMPREY.

One specimen from Lake Pleasant, 4 from Bogachiel and 2 from Snells, these 1⅞ to 4⅜ inches long; seven, 5 to 7¾ inches long, from San Pablo Bay.

2. **Rhinotriacis henlei** Gill.

Six examples, 7 to 13 inches long, of this shark from shrimp nets at San Bruno Point, San Francisco Bay.

3. **Triakis semifasciatum** Girard.

LEOPARD SHARK.

Two specimens, 7½ and 7¾ inches long, from Tomales Bay.

4. **Raja inornata** Jordan & Gilbert.

COMMON SKATE OF CALIFORNIA.

Three specimens, 5 to 5¼ inches long, from San Pablo Bay.

5. **Acipenser transmontanus** Richardson.

WESTERN STURGEON.

One specimen from Chinook.

6. **Ameiurus catus** (Linnæus).

CATFISH.

One specimen, 7½ inches long, from Mare Island. An introduced species.

7. **Catostomus macrocheilus** Girard.

COLUMBIA RIVER SUCKER.

Nine specimens, 1¾ to 5¾ inches long, from Lake Pleasant; one, 15½ inches long, from Willapa River.

8. **Pogonichthys macrolepidotum** (Ayres).

SPLIT-TAIL.

Thirteen specimens, 2¼ to 8¼ inches long, from Mare Island.

9. **Ptychocheilus oregonensis** (Richardson).

SQUAWFISH.

Eighteen specimens, 2⅜ to 7½ inches long, from Lake Pleasant; eight, 1¼ to 5 inches long, from Ozette Lake.

10. **Ptychocheilus harfordi** Jordan & Gilbert.

One specimen, 9¼ inches long, from Mare Island.

11. **Leuciscus bicolor** (Girard).

Nine specimens, 1⅜ to 3⅛ inches long, from Lake Quinault.

12. **Rutilus bicolor** (Girard).

Twenty specimens from Walker Creek.

13. **Rutilus symmetricus** (Baird & Girard).

Twenty-three specimens, 2⅛ to 4½ inches long, from a deep pond one mile from mouth of Olima Creek, but connected with it; six specimens, 3¾ to 6¾ inches long, caught on hooks at the mouth of Papermill Creek;

ten, 1⅜ to 5 inches long, from Bear Valley Creek, below flood gate; sixteen, 1 to 2 inches long, from Papermill Creek; three specimens, 2¼ to 2¾ inches, from Lake Quiniault; sixteen, 1⅜ to 2 inches long, from mouth of Bear Valley Creek; twenty-four, 1 to 1⅝ inches long, from Papermill Creek at tide water.

14. **Rhinichthys cataractae dulcis** (Girard).

DACE.

Seventy-eight specimens, 1 to 2⅜ inches long, from Tacoma Creek; twenty-three, 1½ to 3½ inches long, from Lake Quiniault; two, 1⅝ and 2⅝ inches long, from Queets River; ten, 2 to 2½ inches long, from Clearwater; eleven, ⅞ to 1¼ inches long, from Willapa River.

15. **Clupea pallasii** Cuvier & Valenciennes.

CALIFORNIA HERRING.

One specimen, 6½ inches long, from San Pablo Bay; one, 2¾ inches long, from Angel Island; one, 2⅞ inches long, from South Belmont Oyster Beds; one, 7¼ inches long, from San Mateo Camp.

16. **Alosa sapidissima** (Wilson).

COMMON SHAD.

One specimen, 5¾ inches long, from Mare Island. An introduced species.

17. **Engraulis mordax** Girard.

CALIFORNIA ANCHOVY.

Five specimens, 2½ to 2¾ inches long, from Tomales Bay, between Hamilton landing and Inverness; five, 3¼ to 3¾ inches long, from San Pablo Bay; one, 3⅜ inches long, from South Belmont Oyster Beds; three, 3 to 3½ inches long, from San Mateo Camp.

18. **Coregonus williamsoni** Girard.

WILLIAMSON'S WHITEFISH.

Five specimens from Hah River and four from Quiniault River above lake, 2½ to 3⅞ inches in length; and eighteen examples, 2⅝ to 6 inches long, from Queets River.

Gillrakers 9+12 to 14; scales, 9–78 to 84–8; D. 14; A. 12.

19. **Oncorhynchus tschawytscha** (Walbaum).

CHINOOK SALMON.

Eight specimens, 1¼ to 2 inches in length, from a deep pond one mile from the mouth of Olima Creek, but connected with it; one from junction of Nicasio and Papermill creeks, 4¼ inches long; nineteen examples, 2⅝ to 4¼ inches long, from Quiniault River above the lake; eight from Lake Quiniault, 2¼ to 2⅞ inches long; ten from Queets River, 3½ to 4¼ inches long; one example, 4¼ inches long, from Wills Creek; six specimens, 3 to 3½ inches long, from Clearwater; and two, 1⅜ and 1½ inches long, from Bear Valley Creek.

20. **Oncorhynchus kisutch** (Wallbaum).

SILVER SALMON.

Two specimens, $3\frac{1}{2}$ and 4 inches long, from Hurst Creek; thirty-three specimens, $1\frac{5}{8}$ to $3\frac{1}{4}$ inches long, from Moss Creek; eight from Lake Pleasant, $2\frac{3}{8}$ to 4 inches long; five, $2\frac{1}{4}$ to $3\frac{1}{4}$ inches long, from Wills Creek; five, $2\frac{1}{2}$ to $3\frac{1}{2}$ inches long, from Raft River; two, $3\frac{1}{4}$ and $3\frac{1}{2}$ inches long, from Bogachiel; thirteen specimens, 2 to 4 inches long, from Tacoma Creek; nine specimens, $2\frac{1}{2}$ to $3\frac{1}{4}$ inches long, from Hwah River; eleven specimens, 2 to $3\frac{1}{4}$ inches long, from Prairie Creek; nineteen specimens, $1\frac{7}{8}$ to 3 inches long, from a creek tributary to Humptulips Creek, near Humptulips; four specimens, 2 to $2\frac{1}{2}$ inches long, from Willapa River; three specimens, $2\frac{1}{2}$ to $4\frac{1}{2}$ inches long, from Elk Creek; and three, $2\frac{1}{2}$ inches long, from Ozette Lake.

21. **Oncorhynchus nerka** (Wallbaum).

BLUEBACK SALMON.

Fifteen specimens, 1 to $1\frac{1}{4}$ inches long, from Rivers Inlet.

22. **Salmo mykiss** Wallbaum.

CUTTHROAT TROUT.

One specimen, $7\frac{1}{2}$ inches long, from Malaspina Inlet, at Lund.

23. **Salmo gairdneri** Richardson.

STEELHEAD.

Eight specimens, $1\frac{1}{8}$ to $5\frac{1}{2}$ inches long, from junction of Nicasio and Papermill creeks; sixteen specimens, $1\frac{7}{8}$ to $8\frac{1}{4}$ inches long, from Beaver Lake; eight specimens, $1\frac{3}{4}$ to $4\frac{5}{8}$ inches long, from Quiniault River above lake; four, 2 to $2\frac{1}{2}$ inches long, from Hurst Creek; four, 4 to $7\frac{1}{4}$ inches long, from a creek tributary to Lake Quiniault; three, 2 to $5\frac{1}{2}$ inches long, from Queets River; three, $1\frac{7}{8}$ to $3\frac{3}{8}$ inches long, from Clearwater; seven, $1\frac{7}{8}$ to $2\frac{1}{2}$ inches long, from a creek tributary to Humptulips Creek, near Humptulips; and nineteen specimens, $1\frac{3}{8}$ to $2\frac{1}{4}$ inches long, from Willapa River.

24. **Salmo irideus** Gibbons.

RAINBOW TROUT.

One specimen, $5\frac{1}{2}$ inches long, from Bear Valley Creek, below flood gate; one specimen from Chinook; two, $7\frac{1}{2}$ and 8 inches long, from Lake Crescent; one, $4\frac{1}{4}$ inches long, from Hah River; twenty-seven specimens, $1\frac{5}{8}$ to $4\frac{1}{4}$ inches long, from Moss Creek; fourteen specimens, $1\frac{7}{8}$ to $6\frac{1}{4}$ inches long, from Wills Creek; four, $1\frac{3}{4}$ to $4\frac{1}{4}$ inches long, from Raft River; thirteen specimens, $1\frac{1}{2}$ to $2\frac{5}{8}$ inches long, from Tacoma Creek; four, $1\frac{3}{4}$ to $2\frac{1}{8}$ inches long, from Bogachiel; five, $1\frac{3}{4}$ to 4 inches long, from Hwah River; and two, 2 inches long, from Lake Pleasant.

25. **Osmerus thaleichthys** Ayres.

Ten specimens, 2 to $4\frac{5}{8}$ inches long, from San Pablo Bay; one, $2\frac{3}{4}$

inches long, from San Mateo Camp; and two, $2\frac{7}{8}$ and 3 inches long, from Mare Island.

26. **Hypomesus pretiosus** (Girard).

SURF SMELT.

One specimen, 3 inches long, from Tomales Bay near the railroad long trestle, 3 miles from Point Reyes Station.

27. **Gasterosteus williamsoni microcephalus** (Girard).

CALIFORNIA STICKLEBACK.

Three specimens, $1\frac{5}{8}$ to $1\frac{3}{4}$ inches long, from Papermill Creek; two specimens, $1\frac{7}{8}$ and $2\frac{1}{4}$ inches long, from Papermill Creek one-half mile below White House; one, $1\frac{3}{4}$ inches long, from South Belmont Oyster Beds; thirty, $\frac{7}{8}$ to $2\frac{5}{8}$ inches long, from a deep pond one mile from the mouth of Olima Creek; sixteen, $1\frac{1}{2}$ to $2\frac{1}{8}$ inches long, from junction of Nicasio and Papermill creeks; ten, from Walker Creek; twenty-five, 1 to $2\frac{3}{4}$ inches long, from Lake Quiniault; nine, $1\frac{1}{2}$ to $2\frac{1}{4}$ inches long, from Lake Pleasant; one, $1\frac{7}{8}$ inches long, from Elk Creek; four, $1\frac{1}{2}$ to $1\frac{3}{4}$ inches long, from Ozette Lake; three, $1\frac{5}{8}$ to $2\frac{1}{8}$ inches long, from mouth of Bear Valley Creek, and one, $2\frac{1}{8}$ inches long, from Papermill Creek at tide water.

28. **Siphostoma californiensis** (Storer).

CALIFORNIA PIPEFISH.

Fifteen specimens, 4 to $8\frac{1}{2}$ inches long, from San Pablo Bay.

29. **Siphostoma griseolineatum** (Ayres).

Three specimens, $7\frac{3}{4}$ to 9 inches long, from Tomales Bay, at railroad "long fill," 3 miles from Point Reyes Station; three, 5 to $8\frac{1}{2}$ inches long, from Tomales Bay, between Hamilton landing and Inverness; and eight, $4\frac{1}{2}$ to $6\frac{1}{2}$ inches long, from Tomales Bay near railroad long trestle 3 miles from Point Reyes Station.

30. **Atherinopsis californiensis** Girard.

CALIFORNIA SMELT.

Eleven specimens, $2\frac{5}{8}$ to $4\frac{1}{4}$ inches long, from Tomales Bay near railroad long trestle, 3 miles from Point Reyes Station.

31. **Atherinops affinis** (Ayres).

LITTLE SMELT.

One specimen, $4\frac{5}{8}$ inches long, from San Pedro; seven specimens, $2\frac{3}{4}$ to $6\frac{1}{2}$ inches long, from Angel Island; twenty specimens, $1\frac{3}{8}$ to $5\frac{1}{4}$ inches long, from South Belmont Oyster Beds; and one, $4\frac{3}{4}$ inches long, from Hamilton landing tower, Papermill Creek.

32. **Atherinops regis** Jenkins and Evermann.

Eleven specimens, 1 to $1\frac{1}{8}$ inches long, from Tomales Bay, $\frac{1}{2}$ mile below the "long fill."

33. **Archoplites interruptus** (Girard).

SACRAMENTO PERCH.

One specimen, 5⅝ inches long, from Mare Island.

34. **Roccus lineatus** (Bloch).

STRIPED BASS.

Three specimens, 4¾ to 5½ inches long, from Tomales Bay, at railroad "long fill," 3 miles from Point Reyes Station; and one specimen, 5¼ inches long, from Tomales Bay, near railroad long trestle, 3 miles from Point Reyes Station.

An introduced species.

35. **Paralabrax clathratus** (Girard).

One specimen, 1⅛ inches long, from San Pedro.

36. **Genyonemus lineatus** (Ayres).

Three specimens, 3¼ to 6 inches long, from San Pablo Bay.

37. **Cymatogaster aggregatus** Gibbons.

VIVIPAROUS PERCH.

Four specimens, 4½ to 5½ inches long, from Tomales Bay, between Hamilton landing and Inverness; six specimens, 2⅞ to 4⅝ inches long, from San Pedro; five, 3¼ to 4 inches long from San Pablo Bay; nine, 2⅛ to 4⅝ inches long, from South Belmont Oyster Beds; and three, 2⅛ to 3⅛ inches long, from San Mateo Camp.

38. **Damalichthys argyrosomus** (Girard).

VIVIPAROUS WHITE PERCH.

One specimen, 4½ inches long, from San Pedro.

39. **Hypsypops rubicundus** (Girard).

GARIBALDI.

One specimen, 4 inches long, from San Pedro.

40. **Sebastodes melanops** (Girard).

Six specimens, 3¼ to 8 inches long, from Barclay Sound.

41. **Sebastodes ruberrimus** Cramer.

RED ROCKFISH.

Four specimens, 2¾ to 6¾ inches long, from San Pablo Bay.

42. **Scorpæna histrio** Jenyns.

One specimen, 4 inches long, from San Pedro.

43. **Ophiodon elongatus** Girard.

CULTUS COD.

One specimen from Chinook.

44. **Cottus asper** Richardson.

PRICKLEY BULLHEAD OR SCULPIN.

Four specimens, $3\frac{1}{4}$ to 5 inches long, from Bear Valley Creek below flood gate; seven, $3\frac{3}{4}$ to 7 inches long, from mouth of Papermill Creek; eleven specimens from Walker Creek; two, $2\frac{1}{4}$ and 4 inches long, from Papermill Creek, $\frac{1}{2}$ mile below White House; two specimens, $2\frac{3}{4}$ and $3\frac{3}{8}$ inches long, from South Belmont Oyster Beds; three specimens, $3\frac{5}{8}$ to $5\frac{3}{4}$ inches long, from Mare Island; ten, $1\frac{3}{4}$ to 6 inches long, from Lake Quiniault; one, 2 inches long, from Hurst Creek; twenty-six specimens, $1\frac{3}{4}$ to $6\frac{5}{8}$ inches long, from Quiniault River, above lake; twenty specimens, $1\frac{3}{4}$ to $3\frac{1}{4}$ inches long, from Beaver Lake; twelve, $1\frac{5}{8}$ to $2\frac{7}{8}$ inches long, from Lake Pleasant; five, 2 to $2\frac{3}{4}$ inches long, from Wills Creek; two, $2\frac{1}{8}$ to $2\frac{3}{4}$ inches long, from Raft River; one, $2\frac{1}{4}$ inches long, from Prairie Creek; one, 2 inches long, from a creek tributary to Humptulips, near Humptulips; four, $2\frac{1}{8}$ to $4\frac{1}{8}$ inches long, from Ozette Lake; one, $1\frac{1}{4}$ inches long, from branch entering east fork of Humptulips River; and eight, $1\frac{7}{8}$ to $2\frac{3}{4}$ inches long, from Tacoma Creek.

45. **Cottus gulosus** (Girard).

Thirty-two specimens, $1\frac{3}{4}$ to $3\frac{5}{8}$ inches long, from junction of Nicasio and Papermill creeks; one, 4 inches long, from Hurst Creek; twelve, $1\frac{3}{4}$ to $2\frac{3}{8}$ inches long, from Quiniault River, above lake; ten, from Hah River, 3 to 4 inches long; eleven, $1\frac{1}{8}$ to $3\frac{3}{4}$ inches long, from Moss Creek; five, $2\frac{3}{8}$ to 3 inches long, from Wills Creek; two, $2\frac{3}{8}$ to 3 inches long, from Raft River; one, $2\frac{5}{8}$ inches long, from Bogachiel; three, $2\frac{3}{4}$ to $3\frac{3}{4}$ inches long, from Queets River; four, $2\frac{1}{4}$ to $3\frac{1}{8}$ inches long, from Hwah River; two, 3 inches long, from Prairie Creek; one, $2\frac{5}{8}$ inches long, from Clearwater; nineteen, $\frac{7}{8}$ to 3 inches long, from Willapa River; fifteen, 2 to $3\frac{1}{2}$ inches long, from Elk Creek; and one, $3\frac{1}{4}$ inches long, from Tacoma Creek.

46. **Leptocottus armatus** Girard.

Twenty-nine specimens, $1\frac{1}{4}$ to $2\frac{1}{2}$ inches long, from Tomales Bay; six, $4\frac{1}{2}$ to $5\frac{1}{2}$ inches long, from Point San Bruno; three, $4\frac{5}{8}$ to $5\frac{1}{2}$ inches long, from San Pablo Bay; two, $5\frac{5}{8}$ and 6 inches long, from South Belmont Oyster Beds; one, $4\frac{1}{2}$ inches long, from San Mateo Camp; fifty-seven, $1\frac{1}{2}$ to $2\frac{1}{8}$ inches long, from Hamilton landing tower, Papermill Creek.

47. **Hypnus gilberti** (Eigenmann and Eigenmann).

Thirty specimens, $1\frac{1}{2}$ to $2\frac{3}{8}$ inches long, from Tomales Bay; three from Walker Creek, and one from Papermill Creek.

48. **Liparis pulchellus** Ayres.

Fifteen specimens, $2\frac{1}{4}$ to $5\frac{3}{4}$ inches long, from San Pablo Bay.

49. **Typhlogobius californiensis** Steindachner.

One specimen, $2\frac{5}{8}$ inches long, from San Pedro.

50. **Porichthys notatus** Girard.

Thirteen specimens, 2⅝ to 3¼ inches long, from San Pablo Bay; two specimens, 7½ and 8 inches long, from Point San Bruno.

51. **Heterostichus rostratus** Girard.

Two specimens, 6⅝ and 7¼ inches long, from San Pedro.

52. **Gibbonsia elegans** (Cooper).

Three specimens, 3½ to 5 inches long, from San Pedro.

53. **Pholis ornatus** (Girard).

Eight specimens, 3¼ to 4½ inches long, from San Pablo Bay.

54. **Arbaciosa rhessodon** (Rosa Smith).

One specimen, 1¾ inches long, from San Pedro.

55. **Merluccius productus** (Ayres).

One specimen from Chinook.

56. **Microgadus proximus** (Girard).

CALIFORNIA TOMCOD.

Four specimens, 5 to 7 inches long, from San Pablo Bay.

57. **Psettichthys melanostictus** Girard.

One specimen, 6¾ inches long, from Point San Pedro.

58. **Hypsopsetta guttulata** (Girard).

DIAMOND FLOUNDER.

One specimen, 4⅞ inches long, from San Pedro, Cal.

59. **Parophrys vetulus** Girard.

Three specimens, 5 to 6¼ inches long, from Point San Pedro; one specimen, 3⅞ inches long, from South Belmont Oyster Beds; three specimens, 4 to 5⅝ inches long, from San Mateo Camp.

60. **Platichthys stellatus** Pallas.

CALIFORNIA FLOUNDER.

Four specimens, 1⅝ to 1⅞ inches long, from Tomales Bay; two specimens, 5⅛ and 6⅛ inches long, from Point San Pedro; and one, 5¾ inches long, from South Belmont Oyster Beds.

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PROCEEDINGS

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THE SCALES OF THE AFRICAN CYPRINID FISHES, WITH A DISCUSSION OF RELATED ASIATIC AND EUROPEAN SPECIES.

BY T. D. A. COCKERELL.

For an opportunity to study the scales of the African Cyprinidæ I am indebted to Dr. G. A. Boulenger, and the account given below is based wholly on the collections in the British Museum. In Dr. Boulenger's Catalogue of the Freshwater Fishes of Africa, Vol. I (1909), there are recognized ten genera of Cyprinidæ proper, namely, *Labeo*, *Discognathus*, *Varicorhinus*, *Barbus*, *Rasbora*, *Leuciscus*, *Leptocypris*, *Barilius*, *Neobola* and *Chelathiops*. Of these, all but *Rasbora*, *Leuciscus* and *Leptocypris* are found in the Nile basin. *Leuciscus*, or rather *Phoxinellus*, is a Palæarctic type found in northern Africa; *Leptocypris* Boulenger, 1900, is a relative of *Barilius*, found in the Congo basin; *Rasbora* Bleeker is an Asiatic genus, of which one of the Asiatic species (*R. daniconius* Ham. Buch.) occurs at Zanzibar. *Chelathiops* Boulenger, 1899, is an African genus related to the Asiatic *Chela*; it occurs in the Congo basin (*C. elongatus*) and in the Nile (*C. bibie*). *Neobola* Vinciguerra, 1894, is said to be allied to the Asiatic *Bola* (which Day includes in *Barilius*); it was based on a species (*N. bottegoi*) from Somaliland, and has another (*N. argentea*) confined to Lake Victoria. It thus appears that the Ethiopian Cyprinid fauna, though numerous in species, shows very little generic differentiation, and is in all respects closely related to that of the Oriental region.

The scale-characters of the African genera, as observed in scales taken from the vicinity of the lateral line, at about the level of the beginning of the dorsal fin, are as follows:

(1.) *Chelathiops*. *C. bibie* Joannis. River Nile. Scales broader than long, the basal and lateral circuli coarse, the apical ones much

finer, the transition abrupt; about nine delicate apical radii, and a few irregular, poorly developed basal ones. The nuclear area is a little basad of the middle, and may be broadly free from circuli, or circulate nearly to the middle. The fish is small and silvery; the scales are large in proportion, though only about 1⅔ mm. across. There are no distinct laterobasal angles. Both the fish and the scales are rather suggestive of the American *Notropis*, though many differences are apparent on close comparison.

The Indian *Chela argentea* Day (Wynad, *F. Day*) has larger scales, with evident laterobasal angles. The apical radii are well defined, about 14, but several imperfect centrad; the basal radii are two or three, but very strong. All this shows evident resemblance to the type of radiation found in *Alestes*, and in the *pleurotænia* group of *Barbus;* that is to say, with few strong radii arising from the nucleus. In *Chela argentea* this is superimposed, as it were, on a system of more ordinary apical radii, and it is only the latter that occur in *Chelæthiops*.

A further study of the scales of *Chela* shows that *C. argentea* is quite exceptional, and I find one species which has scales of essentially the same type as those of *Chelæthiops*, except that there are fairly well developed laterobasal angles, no basal radii, and the apical radii are greatly reduced, with not more than two or three complete. This species is *C.* (*Paralaubuca*) *typus* (type of *Paralaubuca lateralis* Sauvage) from the Mé Kong (Paris Museum). *C. anomalurus* from Sarawak has a scale of the same general character as *C. typus*, but it is excessively short and broad (long. 6, lat. 10 mm.), with no laterobasal angles, and quite numerous but very weak apical radii. On the other hand *C. clupeoides* (Murree, *F. Day*) has small scales which are much longer than broad, with six or seven apical radii and no basal. *C. bacaila* (Orissa, *F. Day*) has scales of the type of *C. clupeoides*, but with at least twice as many apical radii.

The scales of *C. macrochir* (Menam River, *Royal Siamese Museum*) are transversely oval, scarcely radiate, much like *Chelæthiops* but with the coarse lateral circuli extending over into the apical region. This species has the dorsal fin very far back, and the scales were taken from the middle of the side. *Chela sardinella* (Sittang River, *E. W. Oates*) has broad weak scales with about 12 apical radii; there is a dark spot at the fork of the caudal fin.

Thus *Chela*, on the scales, seems to fall into at least three distinct groups: (1.) *C. argentea*, (2.) *C. clupeoides* and *bacaila*, (3.) *C. typus*, *macrochir* and *sardinella*, with a subgroup for *C. anomalurus*. *Chelæthiops* is evidently to be compared with the third group.

The *Chelæthiops* scale has quite a strong superficial resemblance to that of the Characinid *Citharinus congicus*, although in the latter the lateral circuli are more numerous, and less abruptly differentiated from the apical.

(2.) *Neobola*. *N. argentea* Pellegrin (Bugala, Lake Victoria, *Dr. E. Bayon*). Small transversely elongate scales about 2 mm. broad, and not much more than 1 long; no evident angles; nuclear area a little basad of middle; apical and basal radii, but very few and feeble; lateral circuli very widely spaced, abruptly separated (about middle of side) from apical ones. A weak scale of the same type as that of *Chelæthiops*. It may be even better compared with *Barilius* (*Engraulicypris*) *sardella* from Lake Nyassa; this is a slender fish with easily deciduous scales, which are transversely elongated, with the circuli as in *Neobola*, but with better defined apical radii.

(3.) *Barilius*. The following key indicates in a general way the diagnostic characters of the scales of a number of African and Asiatic species.

Large reddish scales with many apical radii . . . . . 1.
Smaller pallid scales . . . . . 2.

1. Scale much broader than long . . . . . *B. microlepis* (Lake Nyassa; *J. E. S. Moore*).
   Scale about as broad as long . . . . . *B. microcephalus* (Lake Nyassa; *J. E. S. Moore*).

2. Scales with a few very strong radiating ribs (or in reverse, grooves), and in all things resembling those of *Chela argentea* . . . . . 3.
   Scales not thus marked . . . . . 4.

3. Intervals between the few apical radii broad . . . . *B. gatensis* (Wynad, *F. Day*).
   Intervals between the apical radii much narrower . *B. canarensis* (S. Canara, *F. Day*).

4. Scales of a rather broad type; basal radii strong; a central spot of dark pigment . . . *B. bendelisis* (Simla, *F. Day*) and *B. coesa* (East Indian Company's collection). These fishes are much alike.
   Scales without a dark pigment spot . . . . . 5.

5. Thin scales of a rather or very broad type . . . . . *B. sardella* (Lake Nyassa, *E. L. Rhoades*), *B. ubangensis* (Kribi River at Efulen, S. Cameroon, *Bates*), *B. nearii* (mountain stream near Petanke, N. E. Rhodesia, *S. A. Neave*).
   Scales not especially broad, basal radii absent or somewhat developed . . . . . 6.

6. African . . . *B. moorii* (Sumba, Lake Tanganyika, *Cunnington*: not adult), *B. loati* (Gondokoro, *W. L. S. Loat*), *B. kingsleyæ* (S. Cameroon, *G. L. Bates*). *B. niloticus* also comes in this group.
   Asiatic . . . *B. tileo*, *B. andersoni*, *B. polylepis*, *B. goha*, *B. barila*, *B. guttatus*, *B. vagra*, *B. ornatus*.

In *B. tileo* there are two rows of round spots along the side. The upper row, of larger spots, alternates with the lower. *B. guttatus* has spots much as in *B. tileo*, and *B. barila* has obscure spots of the same sort. *B. ornatus* has indications of the same spots.

B. gatensis has bars in place of the spots; *B. canarensis* is obscurely barred. *B. loati* and *nearii* have vertical bars; *B. ubangensis* looks like *nearii*. *B. moorii* has rather obscure vertical bars. *B. kingsleyæ* has dusky lateral spots. *B. sardella* is a slender species with easily deciduous scales. *B. niloticus* has the back dusky and the sides silvery, without bars or spots. Dr. Boulenger writes me (Dec., 1909) that he has now removed *B. sardella* from *Barilius* "and placed it, also with the *Neobola*, under the name of *Engraulicypris* Günther." As I have remarked above, the scales are very similar to those of *Neobola argentea*. The lateral circuli terminate obliquely, about the middle of the side, herein differing very conspicuously from those of *B. ubangensis* and *nearii*, which are placed in the same division in the table.

Pelotrophus Günther may be taken to include *B. microlepis* and *B. microcephalus* of Lake Nyassa, constituting a subgenus, I suppose.

Opsaridium Peters, type *B. zambesensis* Peters, I do not know.

Pachystomus Heckel includes Asiatic species with four barbels, as *B. bendelesis* and *vagra*. The name *Pachystomus* is not available, having been used more than thirty years earlier in Diptera. Day also recognizes a subgenus *Bendelisis*, for *B. barila*, a vertically barred species with two barbels, according to his description, though my notes from the fishes (Assam, *F. Day*) describe obscure spots.

According to the scale-characters, the most distinct group is that of *B. gatensis* and *canarensis;* these are placed by Day in typical *Barilius*, along with *B. tileo* and *B. guttatus*.

With the removal of *Engraulicypris*, the African *Barilius* remain a fairly compact group, with no important difference from the Asiatic forms. The large fishes called *Pelotrophus*, in Lake Nyassa, indicate a certain amount of divergence, in response to conditions not found in Asia.

(4.) *Leptocypris*. *L. modestus* (Banzyville, Ubanzi, Congo Free State, *Capt. Royaux*). Scales about $3\frac{1}{4}$ mm. long and 3 broad, with prominent laterobasal angles; nuclear area far basad; obscure rudiments of basal radii; apical radii 8 or 10, well-defined, widely spaced; lateral circuli moderately dense, in the same line with the closer apical ones. This scale is like that of *Barilius kingsleyæ*, except that the apical radii are fewer.

(5.) *Phoxinellus*. See Proc. Biol. Soc. Wash., XXII (1909), p. 216.

(6.) *Rasbora*. I have only the Asiatic *R. argyrotænia* (Baram, Borneo, *Hose*). The scale is large (about 12 mm. long and broad), with

distinct though rounded laterobasal angles; nuclear area subbasal, very broad; apical radii very numerous (45 or more), parallel; basal radii similar to apical, but finer and closer; basal circuli transverse; *apical circuli all longitudinal*, becoming irregular and more or less wavy. The character of the apical circuli is very distinctive; it is an extreme development of the condition found in *Cirrhina jullieni*, in which the very strong apical circuli are oblique, forming with the radii angles of about 45 degrees.

(7.) *Barbus.* This immense genus will be discussed fully in a later paper; it will suffice at the present moment to call attention to some of the groupings based on the scales:

(a.) *B. barbus* (typical) group. Scale oblong, much longer than broad; the apical circuli much coarser than the lateral; base thrown into folds, one of which projects, as in the American genus *Gila*. Also includes *B. lacertoides*. Palæarctic group.

(b.) *B. caucasicus* group. Elongate-oval scales, without the basal lobe. Numerous European species; some, as *B. bocagii*, much broader. *B. setivimensis* from the Atlas Mts. goes in this group, but the scale is broader than typical, with the lateral radii evanescent. A very distinct type is *B. grahami* from Yunnan Fu, the scales oval, extremely minute, the circuli not dense. This fish has four long barbels.

(c.) *B. affinis* group. Scales allied to the last, but much shorter and broader, with laterobasal angles, and the lateral radii usually poorly developed. Well developed in Asia, with such species as *B. wynadensis*, *B. paradoxus*, *B. tor* (*mosal*), *B. bramoides*, *B. enoplosus* (but fewer radii), *B. obtusirostris* (but peculiar), and the Persian *B. kotschyi* (but with distinct lateral radii). In the Mediterrean region it is represented by *B. callensis* (Algiers), *B. lydianus* (type locality Smyrna), *B. ksibi* (Morocco), *B. harterti* (Morocco) and *B. sclateri* from the Guadalquiver River in Spain. African species are *B. bynni* (R. Nile), *B. affinis*, *B. surkis*, *B. oreas* (few apical radii).

(d.) *B. macmillani* group. Much like the last; no lateral radii; basal radii few. Also includes the African *B. tropidolepis* and the Asiatic *B. armatus*. A doubtfully valid group.

(e.) *B. kolus* group, also including *B. waldoi* from Morocco. Scales longer and narrower than in the last group, the laterobasal angles more rounded. The base of the scale is truncate, not rounded as in the *caucasicus* group.

(f.) *B. gonionotus* group, including also *B. javanicus* and *B. altus*, all Asiatic. Base of scale wavy; lateral radii oblique. May be regarded as a long form of the next group.

(g.) *B. chilotes* group. Broad scales, about as broad as long, the laterobasal angles fairly strong, the lateral radii usually bent inwards centrad, or the outer ones failing. A very common type of scale, including the African *B. chilotes*, *platystomus*, *gorguari*, *erlangeri*, *plagiostomus*, *duchesnii*, *oreas* (between this and the *affinis* group), *batesii*, *rueppelli*, *lobogenys*, *altianalis*, *nedgia*, *ruspolii*, and *radcliffii*.

Asiatic species are *B. lithopidos* (but lateral radii not curved basally), *hexastichus*, *douronensis*, *thomassi*, *carnaticus* (lateral radii *very* many), *malabaricus* and *jerdoni*.

(h.) *B. micropogon* group. Much like the last, but very broad scales, broader than long. Includes the Asiatic *B. micropogon*, *jarsinus* (hardly so broad), *oatesii* and *sharpeyi* (Persia). Also the African *B. leptosoma* (not nearly so broad), *rothschildi* (Morocco), and *progenys*.

(i.) *B. longiceps*, from the Lake of Galilee, has a peculiar quadrate scale with rounded corners, and very many radii, apical and basal.

(j.) *B. bowkeri* group. Shape nearly as in *affinis* group, laterobasal angles evident; middle of base emarginate; radii well developed all round. Here go the Asiatic *B. elulinoides* (*himalayensis*) and *macronema* (large scale, rather peculiar), and the African *B. bowkeri* (*mariquensis*), *gregorii* (but basal radii fewer, and weak; lateral radii weak), *intermedius* (but basal radii longer, nuclear area normal), *inermis* (much like *intermedius*), *gudaricus* (large scale), *margarita*, *kursensis*, *bottegoi* and *fritschii*, the last from Morocco. The nuclear area is usually broadly granular.

(k.) *B. apogon* group. Much like the last in form, but no lateral radii, and basal radii nearly obsolete, or with a single one going to the notch. Includes the S. African *B. holubi*, and the Asiatic *B. schlegelii* (Formosa and Japan), *labeo*, *collingwoodii*, *maculatus*, *repasson*, *esocinus* (Persian Gulf), *yunnanensis*, *apogon*, *chagunio* and *compressus* (but apical radii fewer, and two or three weak basal radii).

(l.) *B. brevibarbus* group (African). Much like the last, but scale obtusely triangular; a slight tendency to polygonal areas in nuclear region, affording some transition to the following groups.

The four following groups are closely related, and very distinct from all the previous ones, having a few very strong radii (apical and basal) coming from the nuclear area, in the manner of the Characinid genus *Alestes*. This may be called alestiform sculpture. In many cases the nuclear area is broken up into polygonal spaces; this may occur or be absent in scales from the same fish.

(m.) *B. pinnauratus* group. Scale subquadrate, at least as long as broad, with rather numerous strong radii. Includes the Asiatic

B. pinnauratus, *sarana* (large scale, with basal region larger), *schanicus*, *dorsalis*, *chola*, *pleurotænia*, and the African *B. perince* (R. Nile) and *camptacanthus*.

(n.) *B. goniosoma* group. Like the last, but the polygonal nuclear pattern excessively developed. Includes the Asiatic *goniosoma*, *maculatus* (fish very like *goniosoma*) and *burmanicus*. The African *B. gurneyi* (*natalensis*) may go here, but is peculiar.

(o.) *B. burchelli* group. Like *pinnauratus* group, but scales broader. Lateral circuli coarse in *burchelli*, fine in others, as *mahecola*. Includes the African *B. burchelli*, *taniurus*, *capensis*, *aspilus*, (some polygonal areas), *guirali*, *nummifer*, *rhoadesi* (but radii weak) and *trispilus* (*walkeri*). Asiatic species are *B. lateristriga* (scale not so broad), *palawanensis*, *hampal* (immense scale, not so broad) and *mahecola*.

(p.) *B. chrysopoma* (Asiatic). Scale of the *pinnauratus* type, but long, with the nuclear area far apicad.

It is not suggested that all these groups are natural, but to some extent at least they must be significant. Later studies will no doubt suggest modifications, especially when the characters of the fishes are correlated. Some generic and subgeneric names are applicable as follows:

Cheilobarbus A. Smith. Type, *capensis* (gr. o.)
Pseudobarbus A. Smith. Type *burchelli* (gr. o.)
Anematichthys Bleeker. Type *apogon* (gr. k.)
Hemibarbus Bleeker. Type *barbus* Schlegel (*schlegelii*) (gr. k.)
Labeobarbus Rüpp. Type *nedgia* (gr. g.)

Numerous other names have been proposed for subdivisions of *Barbus*, which is here interpreted in the broadest sense, following Boulenger. No doubt some of these represent valid genera, and it is probable that *Barbus* should be restricted to the Palæarctic groups, but I am not in a position to propose a new classification. According to any reasonable scheme, it appears that enough generic names already exist to supply all requirements, unless perhaps a name should be proposed (at least in a subgeneric sense) for *B. grahami* of Regan.

Day, in his work on the species of British India, recognized three subgenera:

Barbodes, with four barbels.
Capoëta, with two barbels.
Puntius, without barbels.

I have examined the scales of 17 of his *Barbodes*, five of his *Capoëta*, and two (*apogon* and *filamentosus*) of his *Puntius*. On the scale characters, the groups do not hang well together, and for this and other reasons I believe they are to a considerable extent artificial. Day calls attention to the great resemblance between *B. mahecola*, which has four barbels, and *B. filamentosus*, which

has none, and even raises the question whether they are distinct species.

(8.) *Varicorhinus.* An Asiatic and African genus related to *Labeo* and *Barbus.* I have examined three species:

V. beso. Hawash River (*Zaphiro*). Scale about 11½ mm. long and 14 broad; laterobasal angles much greater; basal and lateral circuli very fine, apical (on exposed part of scale) abruptly differentiated, very coarse, broken up into tubercles between the radii; nuclear area nearly central; apical radii numerous, about 40, parallel, not very conspicuous; basal radii three or four, feeble and broken. This rather recalls some of the *Labeo* scales, but is much broader, and without or with only faint traces of the curved lateral radii. This is the type of the genus.

V. tanganicæ. Lake Tanganyika (*Cunnington*). Small delicate scales about 4 mm. long, about as broad as long, varying to broader than long, obtusely subtriangular, with a broad basal median lobe. Nuclear area broadly roughened; lateral and basal circuli widely spaced, or the basal fairly dense; apical circuli evanescent; apical radii about 18, delicate, wavy; basal radii as in *V. beso.* Very distinct from *V. beso.*

V. maroccanus. Oum Erbiah, Morocco (*Riggenbach*). Not adult. Scales subquadrate, about 6 mm. long and 6½ broad; structure essentially as in *V. beso*, with the same sort of tuberculate apical circuli. Apical radii about 16; nuclear area circulate to middle or very broadly rugose; feeble and broken basal radii rather numerous. Belongs to the subgenus *Pterocapoëta* Günther.

In Boulenger's key, *V. beso* goes in the first division, with three other species, while *V. maroccanus* and *tanganicæ* form the second. It seems evident, however, that the two latter are not closely allied. *V. maroccanus*, in spite of several peculiarities, must be grouped with *V. beso*, while *V. tanganicæ* Boulenger forms a group apart. The *tanganicæ* group is distinguished not only by the small size (64–70 in lateral line) and sculpture of the scales, but by the dorsal originating above the ventrals, the last simple ray very strong and ossified, the large eye, the reduction of the barbels to a single rudimentary pair, and the falcate apex of the dorsal and of the caudal lobes.

Dr. Boulenger (1901) originally described *V. tanganicæ* as a member of the Asiatic genus *Capoëta*, writing as follows:

"The discovery of a species of this genus in Lake Tanganyika is particularly interesting from the fact that only one was known from Africa, viz. the Abyssinian *C. dillonii* C. and V.; this is distinguished by the absence of barbels and the greater size of the scales (30 to 32 in the lateral line). In the presence of a pair of barbels and the small size of the scales, *C. tanganicæ* belongs to

the typical section of the genus, inhabiting southwestern Asia; but it has the enlarged dorsal ray neither feeble as in *C. fundulus* Pall. and allied species, nor serrated as in *C. trutta* Heck."

C. dillonii is now placed by Dr. Boulenger in the synonymy of *V. beso*. Upon comparing the scales of *V. tanganicæ* with those of Asiatic *Capoëta*, I find a very marked resemblance. *Capoëta fundulus* (Kurá River, St. Petersburg Museum) has scales closely like those of *V. tanganicæ* in size, sculpture and consistency, but broader, with the apical radii strong and not wavy. *C. steindachneri*, Kessl, is rather more modified, the scales being longer than broad, with strong laterobasal angles, and the subapical circuli forming strong oblique ridges. The scales of *C.* (*Gnathopogon*) *gracilis* are close to those of *V. tanganicæ*, but the apical radii are stronger, and the tubercles formed by the circuli between them are large.

All things considered, *V. tanganicæ* does seem to stand apart from true *Varicorhinus*, and shows some affinity with *Capoëta*. It may therefore be taken as the type of a new subgenus Acapoëta.

(9.) *Discognathus*. A genus of southern Asia and northeast Africa, especially found in torrents and mountain rivers, having a more or less developed suctorial disc on the chin. The skin is usually thick, and is always beset with numerous minute pigment dots; in *D. johnstonii* these are rather larger and very dense, producing a sort of fine marbling. According to Day, typical *Discognathus* of Heckel, which I have not seen, has only one pair of barbels. The Indian and African species have two pairs, and go in the subgenus *Garra* Ham. Buch. The only Asiatic species I have examined is *D. lamta* from Harnai, Afghanistan (*F. Day*). This has subquadrate scales, broader than long (about 6 mm. long and 6½ broad), the apical half covered by the yellow skin. Laterobasal angles evident but obtuse; basal and lateral circuli very fine; apical radii excessively fine and numerous, only about 70 to 90 μ apart, giving the idea that they may be merely coarse longitudinal circuli, but the remains of the true apical circuli (following the line of evolution initiated by *Varicorhinus*) are visible as rounded tubercles between the radii; basal radii irregular and poorly developed, as in allied forms. This scale can easily be recognized as an extreme modification of the *Varicorhinus* type. The apical tubercles (remains of circuli) are suggestive of those found in *Capoëta gracilis* though of course they are much smaller.

The four African species of *Discognathus* seen by me have smaller and broader scales (4 mm. broad and 3 long in *D. johnstonii*, the others a little smaller).

D. blanfordii. Jerrer River, near Harrar (*E. Degen*). Formerly confused with *D. lamta*, with which the scale agrees in all important features. The basal radii are fairly numerous, but very irregular.

D. johnstoni. Victoria Nyanza (*Sir H. Johnston*). Appearance of scale much as in *D. blanfordii*, but the laterobasal angles have wholly disappeared, and the broad nuclear area is broken up by a number of short irregular lines. The apical radii extend to the side of the scale, where they are obliquely crossed by the circuli. The lateral circuli are not so regular as in *D. lamta.*

D. quadrimaculatus. Lake Zwai (*Zaphiro*). Scale much as in *D. blanfordii.* Laterobasal angles rudimentary; nuclear area very far basad; apical radii extremely fine, the middle ones about 50 μ apart; lateral radii irregular and widely spaced, obliquely crossed by circuli; apical circuli represented by scattered round tubercles.

D. dembeensis. Matti R. (Blue Nile) (*P. C. Zaphiro*). Thin scales embedded in thick skin. Scales essentially as in *quadrimaculatus*, the nuclear area far basad. The short basal radii are well developed, and extend laterally in an irregular manner, so that the scale is radiate all round.

Thus, so far as the scales go, the genus *Discognathus* hangs well together, and is separable from *Varicorhinus* by the extreme closeness of the radii.

(10.) *Labeo.* The scales of this large genus may be divided into a number of groups, as in *Barbus.*

(a.) *L. fimbriatus* group. Scales very long, parallel-sided, rounded apically, truncate basally; those of *fimbriatus* are about 15 mm. long and 9 broad. A very distinctive group, approached, but not nearly equalled, in *Barbus* by the group of *B. gonionotus.* The species are Asiatic, including *L. cursa, microphthalmus, kawrus, gonius, fimbriatus, bata, kontius, leschenaultii;* and as a subgroup with shorter scales *L. dussumieri, pangusia, chalybeatus* and *nigripinnis.* The apical circuli are broken up into tubercles; the apical radii differ, being much more numerous in *L. bata* than in *L. fimbriatus.* One African species, *L. barbatus* Boulenger (Boma, Lower Congo) might be classed with the shorter-scaled division of this group, but it is really a rather narrow-scaled member of the *macrostoma* group.

(b.) *L. macrostoma* group. Scales of the subquadrate type, but not much elongated; basal margin obtusely lobed in middle. I have placed here the Asiatic *L. calbasu* and *falcatus* (*dyochilus*), but the latter is broader. The African species are numerous, including *L. macrostoma, niloticus* (few basal radii), *annectens* (but broader), *cylindricus, mesops, relifer* (large reddish scale), *forskalii, greenii* and *victorianus.* The large scales of *L. victorianus* are badly infested by some parasite.

(c.) *L. sladoni* group. Like the last, but no basal radii, and the basal margin straight, or not obviously lobed. This group consists

of two lots of species, one Asiatic, the other from the Transvaal. The Asiatic members are *L. sladoni* (Mandalay, *F. Day*), *L. rienorhynchus* (Jamu, Himalayas, *Schlagintweit*), *L. bicolor* (Calcutta, *F. Day*), *L. sindensis* and *L. diplostomus*. The Transvaal ones are *L. rosæ*, *ruddi* and *capensis*. This group probably has no proper standing, but consists rather of slightly divergent members of the last.

(d.) *L. altirelis* group. The often large scales sculptured about as in the *macrostoma* group, but subcircular, without laterobasal angles. All African, including *L. altirelis*, *senegalensis*, *lineatus*, *coubie* (many basal radii), *darlingi* and *umbratus*. The last is the type of *Abrostomus* A. Smith. *L. horie* forms a subgroup with reduced sculpture.

(e.) *L. walkeri* (*brachypoma*) group. Type of *macrostoma*, but the scales becoming obtusely subtriangular. This may be compared with the *brevibarbis* group of *Barbus*.

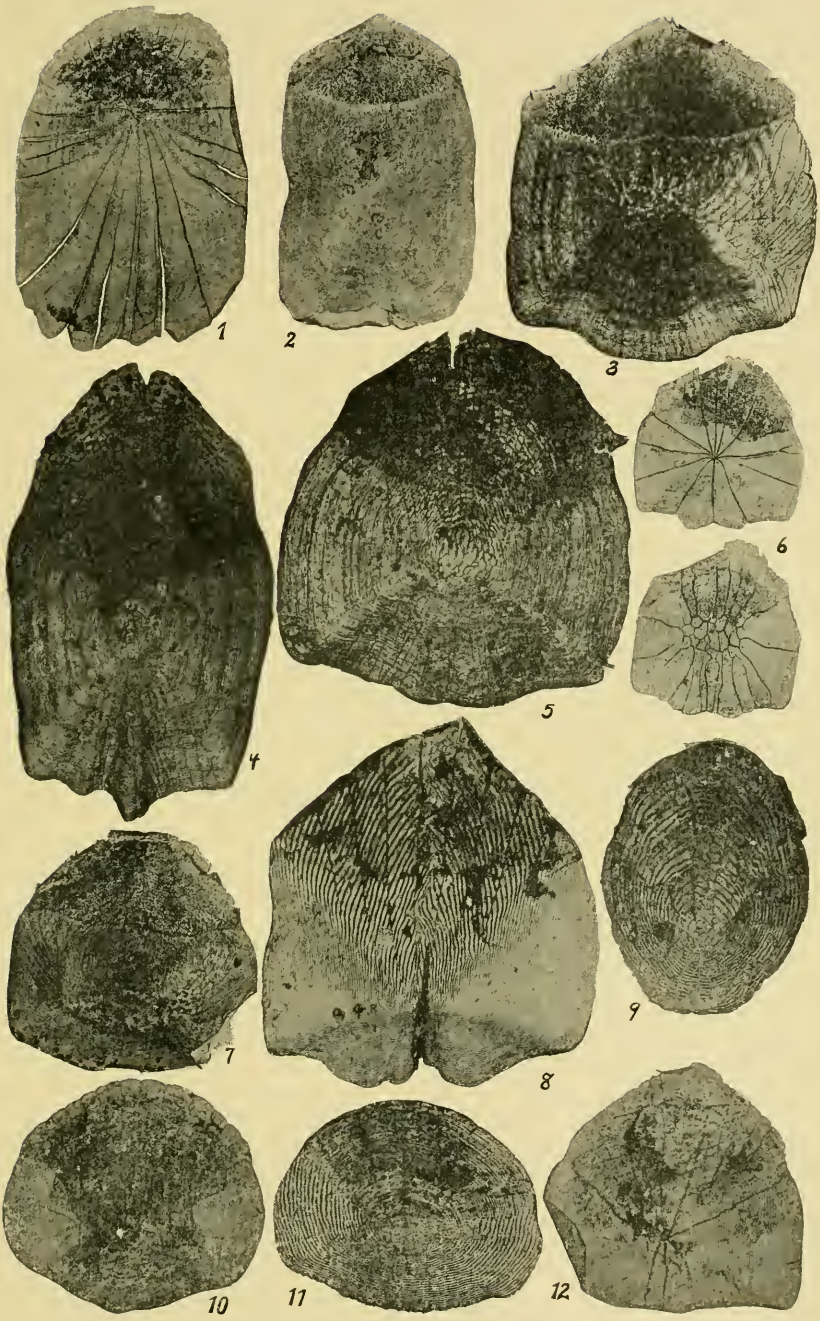
(f.) *L. chrysophekadion* group. This species, from the Menam River, Siam, is very distinct by the character of the apical circuli, which instead of being broken up into tubercles, are continuous, and meet at a sharp angle in the middle line, as in *Cirrhina jullieni*. They are however denser than in the *Cirrhina*. *L. rohita* from Calcutta (*Thos. Moore*) has essentially the same structure, but the circuli are more or less broken up into tubercles. The shape of the scale is essentially as in the *macrostoma* group.

It will be seen that the grouping of *Labeo* here given does not accord well with that based (e. g. by Boulenger) on the fishes. There is however a tendency for the groups to agree with geographical areas, and it is probable that they have some real significance. No doubt some of the groups are artificial, including similar looking scales which actually have different origins.

Regarded as a whole, the African Cyprinid fauna presents some curious historical problems. Africa is the home of a varied fauna of Characinids, which belong to endemic genera. As America was probably the home of this family, and in view of the distinctness of the African Characinid fauna from that found in the Neotropical Region, it must be supposed that the arrival of the Characinids in Africa took place very long ago, perhaps in the Mesozoic. On the other hand, the Ethiopian Cyprinid fauna is obviously Asiatic, and the amount of endemicity (aside from species) is so slight that we must postulate a more recent period of arrival, certainly Tertiary, perhaps not earlier than Miocene. It is curious that with the country so well stocked in advance with Characinids, it was possible for the Cyprinids to spread even to the extreme south, and produce such a large number of specific forms. This may be due in part to a greater adaptability (already well developed in Asia)

to upland streams, as may be suggested by the great number and variety of species in Abyssinia.

Another interesting feature is the palæarctic fauna, poor in species, in north Africa. This fauna does not have things all its own way. It seems natural enough that Ethiopian types should come down the Nile into Lower Egypt, but it is curious that the surprisingly rich (as to species) fauna in the Atlas Mountains should be mixed, Palæarctic and Ethiopian. This seems to point to former (Miocene) conditions in the Sahara region, very different from those observed to-day.



Scales of Cyprinidæ.

Fig. 1. *Barbus chrysopoma.*
Fig. 2. *Labeo fimbriatus.*
Fig. 3. *Barbus batesii.*
Fig. 4. *Barbus barbus (vulgaris).*
Fig. 5. *Barbus ksibi.*
Fig. 6. *Barbus pleurotænia.*
Fig. 7. *Labeo senegalensis.*
Fig. 8. *Cirrhina jullieni.*
Fig. 9. *Barbus grahami.*
Fig. 10. *Barilius loati.*
Fig. 11. *Chelæthiops bibie.*
Fig. 12. *Chela argentea.*

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

TWO NEW WOODPECKERS FROM CENTRAL AMERICA.

BY W. E. CLYDE TODD.

In the course of the writer's studies of the neotropical birds in the collection of the Carnegie Museum, two heretofore unrecognized races of the genus *Melanerpes* have been discovered, but pending the examination of additional material their publication has been delayed. More recent comparisons having apparently confirmed their validity, it has seemed best to publish descriptions of the new forms in advance of the more extensive paper in which they were originally intended to appear. The type specimens have been generously presented to the Carnegie Museum by Pomona College, Claremont, California, through the courtesy of Prof. C. F. Baker.

Melanerpes formicivorus albeolus subsp. nov.

BELIZE WOODPECKER.

Type, No. 32,702, Collection Carnegie Museum, adult male; near Manatee, British Honduras, September 21, 1905; J. D. Johnson.

Subspecific characters.—Similar to *M. f. striatipectus* Ridgway, but with sides and flanks much less streaked, and throat paler yellow, often nearly white.

Description.—Adult male: nasal tufts, chin, sides of head and neck, upper breast, cervix, back, wings, and tail black with a metallic green sheen, less decided on remiges and rectrices, the outer pair of rectrices with small distal spots of white, a large white patch at base of primaries, and the secondaries barred with white on inner webs; rump, upper tail-coverts, forehead, mastax, throat, breast, abdomen, and crissum white, the throat washed with canary yellow, the breast broadly, the sides, flanks and crissum narrowly streaked with black; whole crown and occiput red.

Adult female similar, but crown black.

Measurements of type.—Wing, 136 mm.; tail, 82; exposed culmen, 25; tarsus, 21.

Remarks.—The new form resembles the more southern *M. f. striatipectus* in the character and extent of the breast striping, but differs as aforesaid, the throat being practically white or with only a slight tinge of canary yellow, while in *striatipectus* this color is more pronounced and constant (irrespective of season) than in any other form of this species. Compared with *M. f. formicivorus* from Tetela del Volcan, Morelos, Mexico, assumed to be typical, the British Honduras bird differs further in being much less distinctly streaked on the sides and flanks, giving it a whiter appearance below, this character serving to separate it from all the other known forms, while the pectoral band is less "solid," more extensively striated. None of the series of birds examined from eastern Mexico approach the present form at all closely, so that it seems well entitled to recognition. I have seen no examples from Honduras, but Guatemala specimens seem referable to true *formicivorus*, so that it is probable that the present form is confined to the coast region of British Honduras, possibly extending northward into Yucatan.

Melanerpes pucherani perileucus subsp. nov.

WHITE-BARRED WOODPECKER.

Type, No. 32,703, Collection Carnegie Museum, adult male; near Manatee, British Honduras, December 22, 1905; J. D. Johnson.

Subspecific characters.—Similar to *Melanerpes pucherani* from Nicaragua southward, but with more white on the wing-coverts, rectrices, remiges, and back; and the abdominal red more restricted.

Description.—Adult male: extreme forehead cadmium yellow; crown and occiput carmine; postorbital stripe, superciliary stripe, cervix, sides of neck, back, wings, and tail black, the back regularly barred with white, the wings (except lesser coverts) conspicuously spotted externally, barred internally with white, the outer pair of rectrices imperfectly barred distally with buffy white, the middle pair broadly barred on inner webs with pure white; a white postocular spot; rump and upper tail-coverts white, somewhat spotted and barred with black; lower parts olive gray, deepest on breast, whitish on crissum, and barred with black on all posterior portions; middle of abdomen carmine; lining of wing mottled black and white.

Adult female similar, but crown black, buffy white on anterior middle part.

Measurements of type.—Wing, 115 mm.; tail, 61; exposed culmen, 23.5; tarsus, 21.

Remarks.—*Zebrapicus pucherani* was described by Malherbe (Revue et Magasin de Zoologie, 1849, 542) from "Tabago" (*lege* Tobago), a locality where the species is not known to occur. The later description and plate by the same author (Monographie des Picidées, II, 1862, 227, Pl. 103, figs. 1, 2), however, seems to apply better to the form inhabiting Nicaragua, Costa Rica, and Panama, which is characterized mainly by the less amount of white on the back, wings, and tail, this color being very prominent in the northern bird, giving a decidedly barred effect to the

upper parts. The South American bird may possibly belong to a third form, judging from the only skin available (No. 101,297, U. S. National Museum, Guayaquil, Ecuador), which may be the true *pucherani*, but in any case the bird occurring from Honduras northward to southern Mexico is subspecifically separable. The differences are obvious even in young birds, as may be seen by comparing two such specimens as Nos. 192,800, U. S. National Museum, Carrillo, Costa Rica, and 112,582, Truxillo, Honduras, September 27, 1887, both in fresh juvenal dress. Care must be taken in making comparisons to choose specimens in the same state of plumage, for the white spots and edgings wear away more readily than the black areas, as in other woodpeckers. Many of the Mexican specimens examined are in poor plumage, and consequently fail to show the distinctive characters to the best advantage.

The form under consideration is evidently that which, according to Malherbe (*l. c.*), had been provisionally designated as *melanotis* by Dr. Sclater in 1857, but this name is, of course, a pure *nomen nudum*.

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PROCEEDINGS

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ON A COLLECTION OF FISHES FROM THE LOWER POTOMAC, THE ENTRANCE OF CHESAPEAKE BAY, AND FROM STREAMS FLOWING INTO THESE WATERS.*

BY BARTON WARREN EVERMANN AND SAMUEL FREDERICK HILDEBRAND.

U. S. Bureau of Fisheries.

The collection upon which this paper is based is a miscellaneous one, made chiefly in behalf of the U. S. Fish Commission at various times during the years 1892 to 1900, by the U. S. Fisheries Steamer *Fish Hawk*, and by Messrs. M. C. Marsh, W. C. Kendall, W. H. Sterling, E. C. Starks, W. T. Lindsay, A. Marmaduke, E. Daws, and Capt. L. G. Harron. This material remained unstudied until recently when the present writers went over the entire lot. It was found to contain several interesting species, and enables us to record an extension of the geographic range of a number of species beyond their previously recorded limits. It is hoped that the publication of this list may prove of interest to students of the fish fauna of the region covered by the collection.

The waters and localities from which specimens have been obtained by the above named collectors are as follows:

Potomac River at Jackson City, Alexandria, and Mathias Point, Va.; Bryans Point, Somerset Beach, Riverside, Blackistone Island, Piney Point, and St. Georges Island, Md.; Mattapony River at Milford, Va.; Blackwells Mill Creek, Cockerel Creek, Cape Charles City, Mobjack Bay, Gloucester Point, Buckroe Beach, Old Point Comfort, Hampton Roads, Hampton Creek, Ocean View, and Cape Henry, Va.

* Published by permission of Hon. George M. Bowers, U. S. Commissioner of Fisheries.

This collection consists of a total of 1,487 specimens, all of which have been deposited in the National Museum.

1. **Notropis hudsonius** (De Witt Clinton).
SPAWN-EATER; SPOT-TAILED MINNOW; SHINER.

Four specimens, 1.5 to 2.3 inches long, from Mattapony River.

2. **Notropis hudsonius amarus** (Girard).
SHINER; SPAWN-EATER; SILVER-FIN.

Five specimens, 2.75 to 4 inches long, from Jackson City.

3. **Notropis amœnus** (Abbott).

Two specimens, 1.5 and 2.6 inches long, from Mattapony River.

Hybopsis kentuckiensis (Rafinesque).
HORNY-HEAD; RIVER CHUB.

Five specimens, 2.5 to 5 inches long, from Mattapony River.

5. **Anguilla rostrata** (Le Sueur).
AMERICAN EEL; FRESHWATER EEL.

Three specimens, 3 to 11 inches long, from Somerset Beach; two, 11 and 12 inches long, from Riverside.

6. **Pomolobus mediocris** (Mitchill).
HICKORY SHAD; FALL HERRING.

Thirty-two specimens, 1.5 to 2 inches long, from Somerset Beach; three, 2 to 2.5 inches long, from Riverside; one, 3 inches long, from St. Georges Island; twenty-eight, 3.25 to 4 inches long, from the mouth of Hampton Creek.

7. **Pomolobus pseudoharengus** (Wilson).
ALEWIFE; BRANCH HERRING.

Seven specimens, 1.75 to 2.25 inches long, from Bryans Point.

8. **Pomolobus æstivalis** (Mitchill).
GLUT HERRING; SUMMER HERRING.

Twenty-one specimens, 1.8 to 2.25 inches long, from Riverside; one, 1.5 inches long, from Blackistone Island; eighteen, 2 to 2.2 inches long, from St. Georges Island; fifty-six, 1.4 to 1.6 inches long, from Cockerel Creek; three, 1.5 to 2.4 inches long, from Buckroe Beach; eighty-four, 2.4 to 3 inches long, from the mouth of Hampton Creek.

9. **Alosa sapidissima** (Wilson).
COMMON SHAD; AMERICAN SHAD; POTOMAC SHAD.

Forty-six specimens, 1 to 1.5 inches long, from Jackson City; forty-eight, 1 to 3 inches long, from Bryans Point; five, of equal size, 2 inches long, from Somerset Beach; one 3.3 inches long, from Gloucester Point; five, 2 to 4 inches long, from the mouth of Hampton Creek.

10. **Brevoortia tyrannus** (Latrobe).
MENHADEN; "BUGFISH"; "ALEWIFE."

Six specimens, of equal size, about 2.75 inches long, from Somerset

Beach; three, 4 to 5.5 inches long, from St. Georges Island; eight, 3 to 6 inches long, from Blackwells Mill Creek; seven, from Cockerel Creek; fifty-nine, 2 to 3.5 inches long, from Mobjack Bay; four, 6 to 9 inches long, from Old Point Comfort; three, 2.75 to 4.25 inches long, from the mouth of Hampton Creek.

11. **Stolephorus mitchilli** (Cuvier & Valenciennes).
ANCHOVY.

Thirty-seven specimens, 1.5 to 2.5 inches long, from Somerset Beach; ten, 1.3 to 1.6 inches long, from Riverside.

12. **Synodus fœtens** (Linnæus).
LIZARD-FISH.

Four specimens, 4.5 to 5.5 inches long, from St. Georges Island; one, 2.7 inches long, from Cape Charles City.

13. **Esox reticulatus** Le Sueur.
COMMON EASTERN PICKEREL.

Two specimens, 4 and 4.5 inches long, from Mattapony River.

14. **Fundulus majalis** (Walbaum).
KILLIFISH; MAYFISH.

One specimen, 4 inches long, from Mathias Point; four, of equal size, 2 inches long, from Riverside; five, 3 to 5 inches long, from Blackistone Island; two, 3 and 5 inches long, from Piney Point; thirty-eight, 1.75 to 5.5 inches long, from St. Georges Island; one, 4 inches long, from Cape Charles City; five, 1.2 to 2.25 inches long, from the mouth of Hampton Creek.

15. **Fundulus heteroclitus** (Linnæus).
COMMON KILLIFISH; MUD MINNOW.

Ninety-three specimens, 2 to 3 inches long, from Somerset Beach; twenty-six, 1 to 2 inches long, from St. Georges Island; one, 3 inches long, from Cape Charles City; one, 1.4 inches long, from the mouth of Hampton Creek.

16. **Fundulus diaphanus** (Le Sueur).

Eleven specimens, 1.5 to 2.5 inches long, from Somerset Beach; five, 1.5 to 3 inches long, from Blackistone Island; five, 2 to 3 inches long, from St. Georges Island.

17. **Lucania parva** (Baird & Girard).
RAINWATER-FISH.

Fifty-four specimens, .75 to 1.3 inches long, from St. Georges Island; three, .75 to 1.25 inches long, from Cape Charles City.

18. **Cyprinodon variegatus** Lacépède.
SHEEPSHEAD MINNOW.

Ninety-one specimens, .75 to 1.75 inches long, from St. Georges Island.

19. **Gambusia affinis** (Baird & Girard).
TOP MINNOW.

Ninety-one specimens, .75 to 1.25 inches long, from St. Georges Island. The lot is composed of 14 males and 77 females.

20. **Tylosurus marinus** (Walbaum).
GARFISH; BILLFISH; NEEDLE-FISH.

One specimen, 4.75 inches long, from Bryans Point.

21. **Apeltes quadracus** (Mitchill).

One specimen, 1.2 inches long, from St. Georges Island. Previously not recorded south of New Jersey.

22. **Siphostoma floridæ** Jordan & Gilbert.

Two specimens, 5.25 and 5.5 inches long, from Cape Charles City; three, 3.25 to 6.5 inches long, from mouth of Hampton Creek. Previously not recorded north of Beaufort, N. C.

23. **Siphostoma fuscum** (Storer).
COMMON PIPEFISH.

Two specimens, 4.5 and 6 inches long, from Riverside; one, 5.75 inches long from mouth of Hampton Creek.

24. **Hippocampus hudsonius** De Kay.
COMMON AMERICAN SEA-HORSE.

Two young, about 7 inches long, from Cape Charles City.

25. **Kirtlandia laciniata** (Swain).
SILVER-FISH.

One specimen, 3.2 inches long, from Cape Charles City.

26. **Menidia gracilis** (Günther).

Four specimens, 1.75 to 2.1 inches long, from Hampton Creek.

27. **Menidia gracilis beryllina** (Cope).

Six specimens, 2 to 2.5 inches long, from Alexandria; eight, of about the same size, 2.25 inches long, from Bryans Point; five, 1.5 to 1.75 inches long, from Blackistone Island; fifty, 1 to 1.25 inches long, from St. Georges Island.

28. **Menidia notata** (Mitchill).
SILVERSIDE.

One specimen, 3 inches long, from Riverside; thirty-six, 2 to 4 inches long, from Blackistone Island; one, 2.75 inches long, from St. Georges Island; twenty-one, 2 to 3.75 inches long, from Cape Charles City; four, 3 to 3.75 inches long, from mouth of Hampton Creek.

29. **Querimana gyrans** Jordan & Gilbert.
WHIRLIGIG MULLET.

Three specimens, each about one inch long, from Hampton Creek.

30. **Sphyræna borealis** De Kay.
NORTHERN BARRACUDA.

Two specimens, 1 to 3 inches long, from Cape Charles City.

31. **Trachinotus falcatus** (Linnæus).
ROUND POMPANO; PALOMETA.

One specimen, 2.5 inches long, from near Ocean View.

32. **Enneacanthus gloriosus** (Holbrook).

Seven specimens, each about 1.9 inches long, from Somerset Beach. One specimen abnormal, D. X, 10; A. IV, 9.

33. **Lepomis auritus** (Linnæus).
YELLOWBELLY; REDBREAST BREAM.

One specimen, 2.25 inches long, from Somerset Beach.

34. **Eupomotis gibbosus** (Linnæus).
PUMPKIN-SEED.

Fourteen specimens, 1 to 3 inches long, from Somerset Beach.

35. **Micropterus salmoides** (Lacépède).
LARGE-MOUTHED BLACK BASS.

One specimen, 2.5 inches long, from Mattapony River. Introduced species.

36. **Boleosoma nigrum olmstedi** (Storer).
TESSELATED DARTER.

Two specimens, 1.25 and 1.5 inches long, from Mattapony River.

37. **Roccus lineatus** (Bloch).
STRIPED BASS; ROCKFISH; ROCK.

Eleven specimens, 3.25 to 4.75 inches long, from Hampton Creek.

38. **Morone americana** (Gmelin).
WHITE PERCH.

Twenty-two specimens, 1.5 to 3.25 inches long, from Somerset Beach.

39. **Mycteroperca microlepis** (Goode & Bean).
GAG.

One specimen, 5.5 inches long, from Old Point Comfort. Previously not recorded north of Beaufort, N. C.

40. **Centropristes striatus** (Linnæus).
BLACK SEA BASS; BLACKFISH.

Three specimens, each 2 inches long, from Cape Charles City; six, each 2 inches long, from Cape Henry.

41. **Neomænis griseus** (Linnæus).
GRAY SNAPPER.

Five specimens, 2.25 to 3 inches long, from Old Point Comfort; one, 2.6 inches long, from Ocean View.

42. **Orthopristis chrysopterus** (Linnæus).
PIGFISH; SAILORS CHOICE; HOGFISH.

Thirty-four specimens, 1 to 3 inches long, from Cape Charles City.

43. **Eucinostomus gula** (Cuvier & Valenciennes).
MOJARRA DE LEY.

Sixty-nine specimens, .75 to 2 inches long, from Cape Charles City.

44. **Cynoscion nebulosus** (Cuvier & Valenciennes).
SPOTTED WEAKFISH; SPOTTED SEA TROUT.

One specimen, 3.75 inches long, from St. Georges Island; three, 2 to 2.5 inches long, from Old Point Comfort.

45. **Bairdiella chrysura** (Lacépède).
MADEMOISELLE; YELLOW-TAIL.

One specimen, 3.25 inches long, from St. Georges Island; thirty-eight, .9 to 3 inches long, from Cape Charles City.

46. **Sciænops ocellatus** (Linnæus).
RED DRUM; CHANNEL BASS; REDFISH.

Eight very small specimens, each about .7 inches long, from Gloucester Point.

47. **Leiostomus zanthurus** Lacépède.
SPOT; GOODY.

Six specimens, 2.5 to 3.25 inches long, from Somerset Beach; twenty-two, each about 2 inches long, from Cockerel Creek; eleven, 3.25 to 4.75 inches long, from Hampton Creek; six, each 2 inches long, from Cape Henry.

48. **Micropogon undulatus** (Linnæus).
CROAKER.

Eighteen specimens, 1.5 to 2.5 inches long, from Hampton Creek; two, 1.25 and 2 inches long, from Cape Charles City.

49. **Menticirrhus americanus** (Linnæus).
SAND WHITING; CAROLINA WHITING.

Fourteen specimens, 1 to 2.5 inches long, from St. Georges Island; one, 3.25 inches long, from near Ocean View.

50. **Tautoga onitis** (Linnæus).
TAUTOG; BLACKFISH; OYSTER-FISH.

Three specimens, 2.1 to 3.25 inches long, from Cape Charles City; one, 2.75 inches long, from Old Point Comfort.

51. **Chætodipterus faber** (Broussonet).
ANGEL-FISH; SPADE-FISH.

Two specimens, each 2 inches long, from Hampton Roads; two, 2 and 2.1 inches long, from near Ocean View.

52. **Monocanthus hispidus** (Linnæus).
FOOL-FISH; FILE-FISH; LEATHER-FISH.

Three specimens, 1.1 to 1.75 inches long, from Cape Charles City; four, 1.75 to 2.75 inches long, from near Ocean View.

53. **Spheroides maculatus** (Bloch & Schneider).

One small specimen, 1 inch long, from St. Georges Island; one, 3 inches long, from Cape Charles City.

54. **Chilomycterus schœpfi** (Walbaum).
COMMON BURRFISH; SWELL TOAD.

One small specimen, 1.25 inches long, from Cape Charles City.

55. **Hemitripterus americanus** (Gmelin).
SEA-RAVEN.

Two specimens, 2.6 and 2.9 inches long, from Cape Charles City; one, 5 inches long, from Old Point Comfort.

56. **Microgobius eulepis** Eigenmann & Eigenmann.

Two specimens, each 1.25 inches long, from mouth of Hampton Creek.

A rare species, previously recorded only from Fortress Monroe (the type locality), Beaufort Harbor and from Uncle Israel Shoal, near Beaufort, N. C.

57. **Gobiosoma bosci** (Lacépède).
CLINGING GOBY.

One specimen, 1.5 inches long, from Blackistone Island; one, 1.5 inches long, from Cape Charles City; one, 1.75 inches long, from Gloucester Point; one, 1.75 inches long, from Hampton Creek.

58. **Astroscopus guttatus** Abbott.

One specimen, 2.75 inches long, from Gloucester Point.

59. **Opsanus tau** (Linnæus).
TOADFISH.

Three small specimens, 1.25 to 1.5 inches long, from Cape Charles City.

60. **Hypsoblennius hentz** (Le Sueur).

One specimen, 3.25 inches long, from Old Point Comfort; two, each 2 inches long, from near Ocean View. Previously not recorded north of North Carolina.

61. **Chasmodes bosquianus** (Lacépède).

One specimen, 2 inches long, from Blackistone Island.

62. **Prionotus carolinus** (Linnæus).
COMMON GURNARD; SEA-ROBIN.

One specimen, 3 inches long, from Old Point Comfort; six, 2.5 to 3 inches long, from Hampton Roads; six, 1.5 to 3.5 inches long, from near Ocean View; six, 1.25 to 2.25 inches long, off Cape Henry.

63. **Gobiesox strumosus** Cope.

One specimen, 1.25 inches long, from St. Georges Island; one, 2 inches long, from Gloucester Point.

Head 2.5; D. 10; A. 8.

Not previously recorded north of South Carolina.

64. **Urophycis chuss** (Walbaum).

Four specimens, 4.25 to 6.5 inches long, off Cape Henry.

65. **Paralichthys dentatus** (Linnæus).
SUMMER FLOUNDER.

One specimen, 5.5 inches long, from St. Georges Island; two, 1.75 inches long, from Hampton Creek.

66. **Achirus fasciatus** Lacépède.
AMERICAN SOLE; HOG-CHOKER.

Three specimens, each 1.5 inches long, from St. Georges Island.

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PROCEEDINGS

OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

THE AMPHIBIAN GENERIC NAME *ENGYSTOMA* UNTENABLE.

BY LEONHARD STEJNEGER.

The genus *Engystoma*, as now generally understood, embraces a number of American species, among them our well known southern *E. carolinense*. The term is untenable, however, for this genus.

When Fitzinger instituted the genus in 1826 (Neue Classif. Rept., p. 39) he expressly stated (p. 40) that it was based on Linné's *Rana gibbosa*, that Merrem's *Breviceps*, of 1820, was also based on the same species, but that he preferred his own genus which he alleges was "gleichzeitig aufgestellt." There is no evidence that he published the name *Engystoma* before 1826, however. The later name therefore becomes a synonym of *Breviceps*. That it was so understood by all herpetologists up to 1841 is plain from a perusal of the literature. Cuvier (Règne Anim., 2 ed., II, 1829, p. 112) synonymizes them. So does Wagler (Syst. Amph., 1830, p. 205) who substitutes *Systoma* for both of them. So does Tschudi (Classif. Batr., 1838, p. 86) who accepts Wagler's term. Finally, Fitzinger himself, in 1843 (Syst. Rept., p. 33), abandons *Engystoma* and accepts *Systoma*. Wagler, as early as 1828, separated the *Rana ovalis* of Schneider monotypically as *Microps* (preoccupied) and Tschudi, 1838, substituted for it *Stenocephalus* (which was also preoccupied).

It was not until 1841 that the confusion began. In that year Duméril and Bibron (Erpét. Gén., vol. 8, p. 740) designated *Rana ovalis* as the type of *Engystoma* and in this they were followed by Guenther and later authors, including Boulenger.

In the face of Fitzinger's original designation this perversion can not be accepted under the International Rules of Zoological Nomenclature and it becomes necessary to select a name for the genus which now erroneously is called *Engystoma*. The two earliest names, as stated above, are preoccupied. The next available term is Fitzinger's *Gastrophryne* based on Duméril and Bibron's *Engystoma rugosum*, which has been considered a synonym of our *E. carolinense*.

The synonymy of the genus will then stand as follows:

Gastrophryne Fitzinger.

1828. *Microps* Wagler, Isis, 1828, p. 744 (monotype, *Microps unicolor* = *Rana ovalis* Schneider) (not of Meg., 1823).

1838. *Stenocephalus* Tschudi, Classif. Batr., p. 86 (same type) (not of Latr., 1825).

1841. *Engystoma* Duméril and Bibron, Erpét. Gén., vol. 8, p. 738 (same type by designation) (not of Fitzinger, 1826).

1843. *Gastrophryne* Fitzinger, Syst. Rept., p. 33 (type by original designation, *Engystoma rugosum* Dum. Bibr.).

The species belonging to this genus will stand as follows:

1. *Gastrophryne usta* (Cope) Mexico.
2. *Gastrophryne carolinensis* (Holbrook) S. E. United States.
3. *Gastrophryne texana* (Girard) Texas.
4. *Gastrophryne areolata* (Strecker) Texas.
5. *Gastrophryne elegans* (Boulenger) Mexico.
6. *Gastrophryne ovalis* (Schneider) South America.
7. *Gastrophryne microps* (Duméril and Bibron) Brazil, Guiana.
8. *Gastrophryne aequatorialis* (Peracca) Ecuador.
9. *Gastrophryne albopunctata* (Boettger) Paraguay.
10. *Gastrophryne leucosticta* (Boulenger) Sta. Catharina, Brazil.
11. *Gastrophryne muelleri* (Boettger) Paraguay.
12. *Gastrophryne pictiventris* (Cope) Nicaragua.
13. *Gastrophryne borneensis* (Boulenger) Borneo.

As shown above *Engystoma* becomes a synonym of *Breviceps*, and with it must also disappear the family name *Engystomidæ* (and *Engystomatidæ*). The name *Brevicipitidæ*, created by Cope, in 1867, for a smaller group becomes available, however, and may be used. The more familiar *Phryniscidæ* is unavailable since it has been shown that the genus *Phryniscus* belongs to the *Bufonidæ*.

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OF THE

BIOLOGICAL SOCIETY OF WASHINGTON

A NEW COLUBRINE SNAKE FROM JAVA.

BY THOMAS BARBOUR.

Among a large number of Javanese reptiles collected by Mr. Owen Bryant and Mr. W. Palmer in West Java was a single undescribed snake, representing one of the most distinct species of the genus *Liopeltis* (= *Ablabes* auct.). Curiously enough Mr. Bryant got this specimen right at Buitenzorg, the one locality of all others in Java which has been best explored, and whence collections have been sent to various museums for over a hundred years. There is perhaps less reason for surprise than one might at first suppose; for nearly every year some astonishing novelty turns up here in the United States, which we believe to be even more thoroughly worked over than is this region of Java.

Liopeltis libertatis sp. nov.

Resembling in many respects *L. major*, but really widely different. This new species has two loreals, a much longer tail, and other differences, as a comparison of specimens or descriptions will readily show.

Specific Characters.—Rostral as broad as deep, well turned back above; internasals about two-thirds the size of the praefrontals, which latter are barely in contact with the supraocular; frontal very slightly longer than its distance from tip of snout, longer than the interparietal suture; slightly wider in front than behind, and wider than a supraocular; parietals about equal to the frontal in length; nostril large, slightly oval vertically, in the centre of a large divided nasal; two loreals, the anterior square, the posterior slightly lower and only one-third the width of the other; a single long praeocular, very narrowly separated from the frontal; two postoculars, upper twice as large as lower; temporals 2 + 2, large with straight edges; eight supralabials on each side, fourth and fifth entering eye, seventh largest being, however, but little larger than eighth, sixth tending to a trapezoid form; five lower labials in contact with anterior chin shields, which are slightly shorter than the posterior; fifteen

rows of smooth scales; 173 ventrals, not angulate laterally; anal divided; 109 subcaudals (the very tip of tail missing). *Color:* In spirits, uniform slate color above, lighter below.

Type: Cat. No. 42,932, United States National Museum; Buitenzorg, Java; Owen Bryant collector, July 4, 1909.

This snake is conspicuous at once from the peculiar shape of its head. The profile is arched and very sharply decurved at the snout, the eye being of great size, almost equal, in fact, to its distance from the suture of the nasal shield.

The name is given to commemorate the discovery of this species on Independence Day.

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PROCEEDINGS

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DESCRIPTION OF A NEW GENUS AND SPECIES OF BIVALVE FROM THE CORONADO ISLANDS, LOWER CALIFORNIA.

BY WILLIAM H. DALL.*

During a collecting trip made from San Diego to the Coronado Islands by Dr. Fred Baker and Miss J. M. Cooke quite a number of minute shells were obtained, which were submitted to me for examination. Among them is a small bivalve, with an internal ligament, which can not be referred to any recorded genus.

Bernardina gen. nov.

Shell small, of the general form of *Rochefortia*, concentrically sculptured externally, with a conspicuous prodissoconch, which is elevated in the center and at the margins and between these points somewhat excavated; pallial line entire; hinge with the posterior dorsal margin of the right valve fitting into a shallow groove in the margin of the opposite valve; anteriorly with a strong left lateral fitting between two prominent flexuous right anterior laterals; two right and three left cardinals with the resilium posterior to them all. Hinge formula, exclusive of laterals,

L. r10101
R. r01010

The type is *B. bakeri* sp. nov. The genus is named in honor of the late F. Bernard, of Paris, to whom we owe so much of our knowledge of the developmental history of the bivalve hinge.

Bernardina bakeri sp. nov.

Shell small, short-ovate, white, with sculpture of fine regular concentric grooves with wider interspaces; moderately compressed; umbones moderately elevated, capped by the prodissoconchs; internal margins smooth, the posterior adductor scar larger; hinge as described under the genus, with no external ligament; texture of the shell porcellanous and rather solid. Length, 2.8; height, 1.6; diameter, 1.0 mm.; the vertical of the beaks behind the middle of the shell about one-ninth the total length.

* By permission of the Director of the U. S. Nat. Museum.

Near the South Coronado Island, in three fathoms, collected by Dr. Fred Baker, after whom it is named.. Types, U. S. Nat. Mus. No. 220,099. Cotypes in Baker and Cooke collections.

This genus differs from the Leptonacea by having the internal resilium behind the cardinals as in the Astartacea, to which group it probably belongs. In the structure of the hinge its nearest neighbor is the genus *Cuna* Hedley, but the latter is sufficiently different in detail to require no special comparison.

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TWO NEW WOODPECKERS FROM THE ISLE OF PINES, WEST INDIES.

OUTRAM BANGS.

When in 1905 (American Naturalist, Vol. XXXIX, No. 460, pp. 179–215) Mr. W. R. Zappey and I published an account of the birds of the Isle of Pines, based mostly upon a collection made there the previous year by him, we were aware that the red-bellied woodpecker of the island was not quite the same as that of Cuba; but on account of lack of material for comparison, we did not note any differences in the green woodpecker.

Since then the bringing together of large series of skins has shown that both the woodpeckers of the island are well differentiated subspecies; and Mr. Ridgway has urged me to describe them in time to appear in the forthcoming part of his great work, generously refusing to do so himself.

They may be known by the following short diagnoses:

Centurus superciliaris murceus subsp. nov.

Type from San Juan, Isle of Pines (near Cuba), adult ♂, No. 13,260. Bangs coll. Now in Museum of Comparative Zoölogy. Collected May 2, 1904, by W. R. Zappey.

Characters.—Similar to *C. superciliaris superciliaris* (Temm.) of Cuba, but decidedly smaller; under parts much paler and decidedly less yellowish.

Measurements.—Type, adult ♂. Wing, 138; tail, 94.5; tarsus, 23; culmen, 36. Adult ♀, No. 13,263. Wing, 139.5; tail, 99; tarsus, 24; culmen, 35.

Xiphidiopicus percussus insulæ=pinorum subsp. nov.

Type from Santa Fe, Isle of Pines (near Cuba), adult ♂, No. 13,480, Bangs coll. Now in Museum of Comparative Zoölogy. Collected April 18, 1904, by W. R. Zappey.

Characters.—Similar to *X. percussus percussus* (Temm.) of Cuba, but smaller; coloration paler, especially below; under parts more narrowly and less distinctly streaked, the streaks less blackish, more grayish; red of foreneck more restricted; auricular stripe lighter gray and rather narrower.

Measurements.—Type, adult ♂. Wing, 105; tail, 78.5; tarsus, 22; culmen, 23.5. Adult ♀, No. 13,479. Wing, 106; tail, 84.5; tarsus. 20.5; culmen, 21.

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